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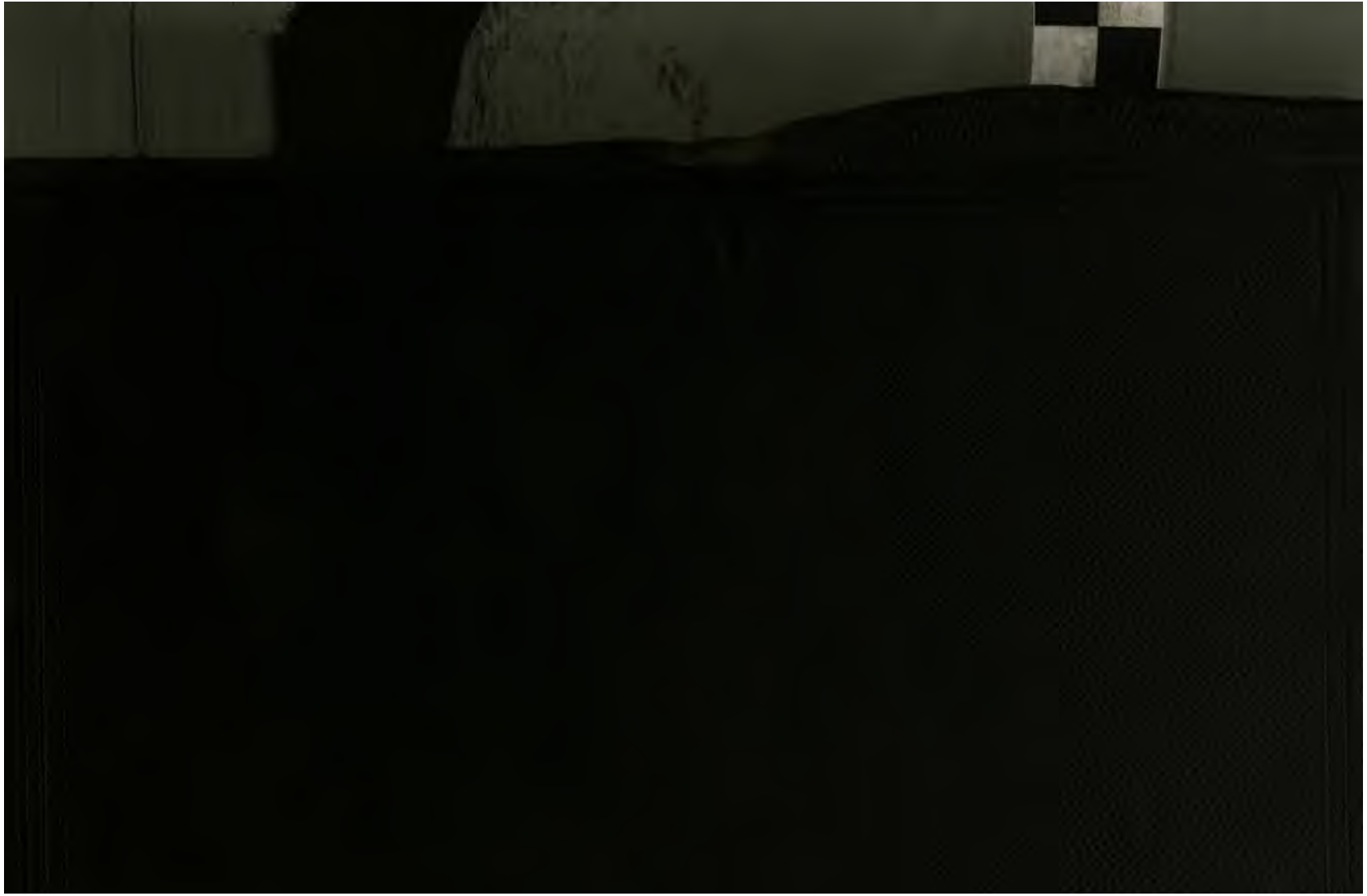

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AT THE

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HELD AT

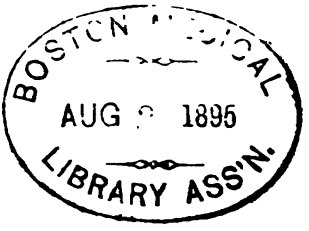
CHICAGO, ILL., AND OLD POINT COMFORT, VA.

Commencing on the 12th of August, 1893, and the 7th of August, 1894.

PUBLICATION COMMITTEE:

GEO. H. CUSHING. E. T. DARBY. A. W. HARLAN.

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.
1895.



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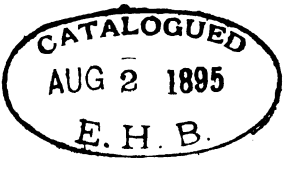

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LIST OF OFFICERS FROM DATE OF ORGANIZATION.

PRELIMINARY CONVENTION, NIAGARA FALLS, AUGUST, 1859.

President,	W. W. ALLPORT . . .	Chicago, Ill.
Secretary,	J. TAFT	Cincinnati, Ohio.

ORGANIZATION AND FIRST SESSION OF ASSOCIATION, WASHINGTON, D. C., JULY, 1860.

[Annual meetings to be hereafter, last Tuesday in July.]

President,	W. H. ATKINSON . . .	Cleveland, Ohio.
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2d Vice-President,	W. CAHOON	Detroit, Mich.
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[NO MEETING IN 1861.]

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1st Vice-President,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
2d Vice-President,	WM. B. HURD . . .	Brooklyn, N. Y.
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Corresponding Secretary,	C. R. BUTLER . . .	Cleveland, Ohio.
Treasurer,	A. C. HAWES	New York City.

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2d Vice-President,	H. BENEDICT	Detroit, Mich.
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Treasurer,	I. J. WETHERBEE . . .	Boston, Mass.

CHICAGO, JULY, 1865.

President,	C. W. SPALDING . . .	St. Louis, Mo.
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2d Vice-President,	JAS. MCMANUS . . .	Hartford, Conn.
Recording Secretary,	J. TAFT	Cincinnati, Ohio.
Corresponding Secretary,	L. D. SHEPARD . . .	Boston, Mass.
Treasurer,	I. J. WETHERBEE . . .	Boston, Mass.

BOSTON, JULY, 1866.

President,	C. P. FITCH	New York City.
1st Vice-President,	W. H. MORGAN	Nashville, Tenn.
2d Vice-President,	L. D. SHEPARD	Boston, Mass.
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Corresponding Secretary,	A. HILL	Norwalk, Conn.
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2d Vice-President,	A. S. TALBERT	Lexington, Ky.
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Corresponding Secretary,	C. R. BUTLER	Cleveland, Ohio.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NIAGARA FALLS, JULY, 1868.

President,	JONATHAN TAFT	Cincinnati, Ohio.
1st Vice-President,	HOMER JUDD	St. Louis, Mo.
2d Vice-President,	A. A. BLOUNT	Springfield, Ohio.
Recording Secretary,	EDGAR PARK	St. Louis, Mo.
Corresponding Secretary,	JAS. MCMANUS	Hartford, Conn.
Treasurer,	W. H. GODDARD	Louisville, Ky.

SARATOGA SPRINGS, AUGUST, 1869.*

President,	HOMER JUDD	St. Louis, Mo.
1st Vice-President,	S. J. COBB	Nashville, Tenn
2d Vice-President,	C. E. FRANCIS	New York City.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON	Boston, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

NASHVILLE, AUGUST, 1870.

President,	W. H. MORGAN	Nashville, Tenn.
1st Vice-President,	S. W. DENNIS	San Francisco, Cal.
2d Vice-President,	J. R. WALKER	New Orleans, La.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON	Boston, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

WHITE SULPHUR SPRINGS, VA., AUGUST, 1871.

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2d Vice-President,	J. R. WALKER	New Orleans, La.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	I. A. SALMON	Boston, Mass.
Treasurer,	W. H. GODDARD	Louisville, Ky.

* Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election; and the sessions of and after 1869 commenced on the first Tuesday in August.

NIAGARA FALLS, AUGUST, 1872.

President,	P. G. C. HUNT . . .	Indianapolis, Ind.
1st Vice-President,	L. D. SHEPARD . . .	Boston, Mass.
2d Vice President,	G. A. MILLS	Brooklyn, N. Y.
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Corresponding Secretary,	J. TAFT	Cincinnati, Ohio.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

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Corresponding Secretary,	J. TAFT	Cincinnati, Ohio.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

DETROIT, AUGUST, 1874.

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1st Vice-President,	GEO. W. KEELY . . .	Oxford, Ohio.
2d Vice-President,	J. S. KNAPP	New Orleans, La.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	GEO. L. FIELD . . .	Detroit, Mich.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1875.

President,	A. L. NORTHROP . . .	New York City.
1st Vice-President,	H. J. MCKELLOPS . . .	St. Louis, Mo.
2d Vice-President,	H. A. SMITH	Cincinnati, Ohio.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

PHILADELPHIA, AUGUST, 1876.

President,	GEO. W. KEELY . . .	Oxford, Ohio.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia, Pa.
2d Vice-President,	CORYDON PALMER . .	New York City.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . . .	Philadelphia, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

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2d Vice-President,	GEO. T. BARKER . . .	Philadelphia, Pa.
Recording Secretary,	M. S. DEAN	Chicago, Ill.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1878.

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2d Vice-President,	L. D. CARPENTER . . .	Atlanta, Ga.
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Corresponding Secretary,	A O RAWLS . . .	Lexington, Ky.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NIAGARA FALLS, AUGUST, 1879.

President,	L. D. SHEPARD . . .	Boston, Mass.
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2d Vice-President,	GEO. L. FIELD . . .	Detroit, Mich.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	M. H. WEBB . . .	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

BOSTON, AUGUST, 1880.

President,	C. N. PEIRCE . . .	Philadelphia, Pa.
1st Vice-President,	W. C. BARRETT . . .	Buffalo, N. Y.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans, La.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

NEW YORK, JULY, 1881.

President,	H. A. SMITH . . .	Cincinnati, Ohio.
1st Vice-President,	W. C. BARRETT . .	Buffalo, N. Y.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans, La.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville, Ky.

CINCINNATI, AUGUST, 1882.

President,	W. H. GODDARD . . .	Louisville, Ky.
1st Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans, La.
2d Vice-President,	E. T. DARBY . . .	Philadelphia, Pa.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
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Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

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1st Vice-President,	C. S. STOCKTON . . .	Newark, N. J.
2d Vice-President,	T. T. MOORE . . .	Columbia, S. C.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

SARATOGA SPRINGS, AUGUST, 1884.

President,	J. N. CROUSE . . .	Chicago, Ill.
1st Vice-President,	M. W. FOSTER . . .	Baltimore, Md.
2d Vice-President,	C. F. RICH	Saratoga, N. Y.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

MINNEAPOLIS, AUGUST, 1885.

President,	W. C. BARRETT . . .	Buffalo, N. Y.
1st Vice-President,	L. C. INGERSOLL . . .	Keokuk, Iowa.
2d Vice-President,	A. T. SMITH	Minneapolis, Minn.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, 1886.

President,	W. W. ALLPORT . . .	Chicago, Ill.
1st Vice-President,	GEO. W. MCELHANEY . .	Columbus, Ga.
2d Vice-President,	S. W. DENNIS . . .	San Francisco, Cal.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, 1887.

President,	FRANK ABBOTT . . .	New York City.
1st Vice-President,	CHARLES R. BUTLER . .	Cleveland, Ohio.
2d Vice-President,	T. SOLLERS WATERS . .	Baltimore, Md.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

LOUISVILLE, KY., 1888.

President,	C. R. BUTLER . . .	Cleveland, Ohio.
1st Vice-President,	A. W. HARLAN . . .	Chicago, Ill.
2d Vice-President,	SAMUEL A. WHITE . .	Savannah, Ga.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

SARATOGA SPRINGS, 1889.

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1st Vice-President,	A. W. HARLAN . . .	Chicago, Ill.
2d Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

EXCELSIOR SPRINGS, MO., 1890.

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1st Vice-President,	J. D. PATTERSON . . .	Kansas City, Mo.
2d Vice-President,	H. B. NOBLE . . .	Washington, D. C.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

SARATOGA SPRINGS, 1891.

President,	W. W. WALKER . . .	New York City.
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2d Vice-President,	S. C. G. WATKINS . .	Mont Clair, N. J.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

NIAGARA FALLS, 1892.*

President,	J. D. PATTERSON . . .	Kansas City, Mo.
1st Vice-President,	J. Y. CRAWFORD . . .	Nashville, Tenn.
2d Vice-President,	S. C. G. WATKINS . .	Mont Clair, N. J.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

OLD POINT COMFORT, AUGUST, 1894.

President,	J. Y. CRAWFORD . . .	Nashville, Tenn.
1st Vice-President,	S. C. G. WATKINS . .	Mont Clair, N J.
2d Vice-President,	THOMAS FILLEBROWN . .	Boston, Mass.
Recording Secretary,	GEO. H. CUSHING . .	Chicago, Ill.
Corresponding Secretary,	EMMA EAMES CHASE . .	St. Louis, Mo.
Treasurer,	HENRY W. MORGAN . .	Nashville, Tenn.

EXECUTIVE COMMITTEE FOR SESSION OF 1895.

J. N. CROUSE, Chairman. C. N. PEIRCE, Secretary.

FIRST DIVISION—COMMITTEE OF ARRANGEMENTS.

†J. N. CROUSE. W. W. WALKER. T. S. WATERS.

SECOND DIVISION—ON CREDENTIALS, ETHICS, AND AUDITING ACCOUNTS.

H. A. SMITH. †LOUIS OTTOFY. †V. H. JACKSON.

THIRD DIVISION—ON VOLUNTARY ESSAYS.

C. N. PEIRCE. D. N. MCQUILLEN. S. G. PERRY.

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* The session of 1893, owing to the holding of the World's Columbian Dental Congress, was purely formal, and by resolution was adjourned "without any election of officers, as the effect of such non-election will be, under the Constitution, to make all officers hold over." The officers elected in 1892 thus acted at the regular session of 1894.

† These go out August, 1895.

CONTENTS.

	PAGE
Disclaimer	ii
Officers from date of organization	iii
Minutes—roll-call	1
Reading of printed minutes dispensed with	6
Minutes *ad interim*	7
Minutes of 1893	7
Minutes of 1894	9
Publication Committee's Report	9
Treasurer's Report	10
Auditing Committee's Report	11
Communication from the Indiana State Dental Association	11
Preamble and resolution regarding Horace Wells Anniversary	11
Committee appointed in connection therewith	12
Committee to examine the books of the Dental Protective Association	12
Motion to send telegram to the American Dental Society of Europe	12
Motion of Dr. McManus regarding the discovery of anesthesia	12
Resignation of Dr. Jenison	12
Invitation to dentists and physicians to the privileges of the floor	12
Committee on Necrology filled	12
President's Address referred	12
Treasurer instructed to pay all bills	13
World's Columbian Dental Congress Report	13
Motion to appropriate $500 to the Congress	15
Auditing Committee's Report	16
Committee on Credentials Report	16
Sections—Organization of	17
Time for the consideration of report on President's Address fixed	18
Dr. Thomas's report on Anesthesia	19
Committee appointed to prepare a history of the classification of dentists	20
Standing resolution ordering two general addresses to be delivered annually	20
Committee on Necrology's Report	20
State and Local Societies—Committee's Report	20
Motion to continue Committee with authority to issue another set of questions	21
Committee appointed to examine the books of Dental Protective Association Report	21
Dr. Crouse granted ten minutes	21
Consideration of the Report on the President's Address	22
Dr. Holly Smith's motion to appoint a Committee as suggested by Dr. Guilford	23

PAGE

Standing Committee on Terminology appointed 23
Suggestion of Dr. Guilford as to Dr. Corydon Palmer's notation referred 23
Motion of Dr. Abbott on Unification of Dental Laws 23
Motion of Dr. Fillebrown to appoint a Committee to confer with the Southern Dental Association 24
Report of discussions of the Kansas State Dental Society returned to the Committee 24
Committee appointed to investigate pyorrhea 24
Revision of the Constitution, consideration of, postponed . . . 25
Paper by Dr. Morrison ordered read by title 26
Dr. Guilford requests further consideration of Pathology . . . 26
Auditing Committee of the World's Columbian Dental Congress Report 26
Executive Committee's Report 26
Selection of place of next meeting 27
Election of officers 27
Vote of thanks to railroads, etc. 28
Vote of thanks to Dr. A. H. Fuller 28
Publication Committee appointed 28
Local Committee of Arrangements 28
Report on Necrology 29
Address of Welcome—by Dr. Campbell 31
Response of President Patterson 32

REPORTS AND VOLUNTARY PAPERS.

Annual Address 33
Report of Committee on same 40
Schedule of questions suggested for the consideration of State and Local Societies 41

SECTION I.—PROSTHETIC DENTISTRY, CHEMISTRY, AND METALLURGY.

Report by R. M. Sanger, Chairman 42
Description of the Sharp Dental Furnace 44
Description of Hollow Gold Dummies, and Ferrule Crowns without Exposure of Gold, by George Evans 50
Description of Daly's Method of Lining Rubber Plates, by H. B. Noble 59
Description of Method of Vulcanizing Rubber between Metals, by St. George Elliott 61
Description of a Process of Fusing Platinum by Electricity, by L. E. Custer 63
Description of a Hydraulic Press for Swaging, by E. A. Bogue . . 64
Swaging with Shot, by L. L. Barber 67
Description of Appliances for Correcting Irregularities, etc., by V. H. Jackson 68
Description of Automatic Pump, by J. N. Crouse 82
Bridges, by W. N. Morrison 84

SECTION II.—DENTAL EDUCATION, LITERATURE, AND NOMENCLATURE.

PAGE
Report by Louis Ottofy, Chairman 86
Dental Nomenclature, Report by S. H. Guilford, Secretary of the Section 111
Paper, Etiological Classification of Pyorrhea Alveolaris, by M. L. Rhein 113

SECTION VI.—ETIOLOGY AND PHYSIOLOGY.

Report by H. A. Smith, Chairman 116
Paper, Etiology of Dental Caries, by S. B. Palmer 135
Report—Final—on Examination of Pre-historic Crania 158

SECTION VII.—ANATOMY, PATHOLOGY, AND SURGERY.

Report by T. W. Brophy, Chairman 188
Paper, Exsection of the Inferior Dental Nerve, by T. W. Brophy . . 192
Paper, Planting Teeth, by W. N. Morrison 199
A Question in Pathology, by J. Howard Gaskill 202

SECTION III.—OPERATIVE DENTISTRY.

Report by S. C. G. Watkins, chairman *pro tem.* 215

SECTION V.—MATERIA MEDICA AND THERAPEUTICS.

Report by Geo. Edwin Hunt, Secretary 217
Report by A. W. Harlan, Chairman 221
Formalin—remarks by J. S. Cassidy 225

DISCUSSIONS.

The Sharp Dental Furnace—discussed by

Dr. Boice 47
Dr. Sharp . . . 47, 48
Dr. Weeks 48
Dr. Taft 48
Dr. Sill 48
The President 49
Dr. D. D. Smith 49

Hollow Gold Dummies, etc.—discussed by

Dr. Freeman . . 55, 56
Dr. Evans . . . 55, 56
Dr. Sill 56
Dr. Gardiner . . . 56, 58
Dr. Crouse 57, 58
Dr. Brophy 58

Hydraulic Press for Swaging—discussed by

Dr. Butler 65
Dr. Bogue . . . 65, 66
Dr. Elliott 65

A Method of Making Appliances, etc., for Irregularities—discussed by

Dr. Rhein 78
Dr. Jackson . . 78, 79
Dr. Holly Smith . . . 78
Dr. Crawford . . . 78
Dr. W. H. Morgan . . . 79
The President 79
Dr. Kulp 80

Automatic Pump—discussed by

Dr. Kulp . . . 82, 83 | Dr. Crouse 82, 83

Dental Education—discussed by

PAGE

Dr. Abbott 98, 99, 100, 101, 103, 108 | Dr. Taft . . . 101, 104, 106
Dr. Ottofy . . . . 98, 108 | Dr. Truman . . 102, 105, 106
Dr. Elliott . . . . . 99 | Dr. Marshall . . . 104, 105
Dr. W. H. Morgan . . 99, 101 | Dr. Kulp 106
Dr. Bogue . . . . 99, 103 | Dr. T. T. Moore . . . 107
Dr. Crouse . . . 100, 101, 102 | Dr. McKellops . . . 107
Dr. Peirce . . . . . 100 | Dr. Catching . . . 107

Classification of Pyorrhea Alveolaris—discussed by

Dr. Truman . . . . 115 | Dr. Rhein 115
Dr. Harlan 115

Pyorrhea Alveolaris—discussed by

Dr. Peirce . . . 122, 130 | Dr. Crouse . . . 128, 129, 130
Dr. Abbott . . 123, 124, 130 | Dr. Noble 128
Dr. Guilford . . . . 123 | Dr. W. H. Morgan . . 129, 132
Dr. Crawford . 124, 129, 131 | Dr. Taft 130, 133
Dr. Rhein . . 124, 130, 133 | Dr. Bogue 131, 132
Dr. Marshall . . 126, 131 | Dr. Harlan 132

Etiology of Dental Caries—discussed by

Dr. Abbott . 147, 148, 153, 154 | The President 151
Dr. Crawford 148, 151, 152, 157 | Dr. Jack 152
Dr. Palmer . . 148, 154, 157 | Dr. Bogue 154
Dr. Marshall 148, 150, 152, 156 | Dr. Truman 157
Dr. Harlan . . 149, 151, 152

Exsection of the Inferior Dental Nerve—discussed by

Dr. Truman . . . . 194 | Dr. Marshall . . . 195, 196
Dr. Brophy 194, 195, 196, 197, 198 | Dr. Cushing 197
Dr. Crawford . . 194, 195 | The President 197

A Question in Pathology—discussed by

Dr. Gaskill, 202, 203, 205, 206, 209 | Dr. Palmer 206
Dr. Crawford . . 203, 208 | Dr. Ottofy 209
Dr. West . . . . 203 | Dr. T. T. Moore . . . 210
Dr. Jack . 203, 207, 208, 211 | Dr. Peirce 211
Dr. Guilford . . . 203 | President Patterson . . . 212
Dr. Abbott, 204, 205, 206, 211, 214 | Dr. McKellops . . . 213, 214
Dr. Marshall, 204, 205, 206, 209, 214 | Dr. Crouse 213
Dr. Holly Smith . . 206, 208 | Dr. Brophy 213

Operative Dentistry—discussed by

Dr. Peirce 216

Standing Resolutions 227

BOSTON MEDICAL
AUG 2 1895
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MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION,

SESSION OF 1893-1894.

BY GEORGE H. CUSHING, SECRETARY.

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Thirty-fourth Annual Session in the Banquet Hall of the Hygeia Hotel, Old Point Comfort, Va., at 11 A.M., Tuesday, August 7, 1894; the President, Dr. J. D. Patterson, in the chair.

Prayer was offered by Rev. H. C. Cheatam, of Hampton.

Dr. H. Wood Campbell, President of the Virginia State Dental Society, then made an eloquent address of welcome, to which the President, Dr. Patterson, briefly responded.

The roll was then called, and the following were found either to be present or to have forwarded their dues.

ABBOTT, FRANK	22 West Fortieth st., New York City.
AMBLER, H. L.	157 Euclid ave., Cleveland, Ohio.
AMES, W. V. B.	Venetian Building, Chicago, Ill.
*BAIRD, W. H.	Burlington, Iowa.
BARBER, L. L.	311 Summit st., Toledo, Ohio.
BARLOW, F. C.	646 Jersey ave., Jersey City, N. J.
*BARNES, HENRY	106 Euclid ave., Cleveland, Ohio.
BARRETT, W. C.	208 Franklin st., Buffalo, N. Y.
*BISHOP, J. ADAMS	30 West Forty-eighth st., New York City.
BOGUE, E. A.	29 East Twentieth st., New York City.

Those marked thus (*) were not present, but sent their dues.
Those marked thus (*d*) were delegates, but not permanent members.

BOICE, ALONZO	1612 Vine st., Philadelphia, Pa.
BOSWELL, H. H.	322 Franklin st., Buffalo, N. Y.
*BRACKETT, C. A.	102 Touro st., Newport, R. I.
BROPHY, TRUMAN W.	126 State st., Chicago, Ill.
*BROWN, A. E.	1911 Michigan ave., Chicago, Ill.
*BROWN, S. B.	Fort Wayne, Ind.
BURKHART, H. J.	Batavia, N. Y.
*CARROLL, C. C.	Meadville, Pa.
CASSIDY, J. S.	Covington, Ky.
*CHAIM, MORRIS L.	Room 18, Cooper Institute, New York City.
CHASE, EMMA EAMES	2602 Locust st., St. Louis, Mo.
CHASE, W. G.	40 Nassau st., Princeton, N. J.
*CHENEY, G. F.	3 Central st., St. Johnsbury, Vt.
*CHITTENDEN, C. C.	24 West Main st., Madison, Wis.
*CLAPP, DWIGHT M.	62 Trinity Terrace, Boston, Mass.
CLIFTON, W. R.	Waco, Texas.
*COLDING, HENRY S.	105 Jones st., Savannah, Ga.
*COLE, J. H.	Norfolk, Neb.
*CONRAD, WM.	321 N. Grand ave., St. Louis, Mo.
*COOK, C. D.	133 Pacific st., Brooklyn, N. Y.
*COULSON, D. E.	Galesburg, Ill.
CRAWFORD, J. Y.	Nashville, Tenn.
CRENSHAW, WM.	Atlanta, Ga.
CROUSE, J. N.	2231 Prairie ave., Chicago, Ill.
*CRYER, M. H.	1527 Arch st., Philadelphia, Pa.
CULVER, M. B.	1529 Locust st., Philadelphia, Pa.
*CURTIS, GEO. L.	124 West Thirty-fourth st., New York City.
CUSTER, L. E.	Dayton, Ohio.
CUSHING, GEO. H.	31 Washington st., Chicago, Ill.
*DARBY, E. T.	1513 Walnut st., Philadelphia, Pa.
*DAVENPORT, I. B.	30 Avenue de l'Opéra, Paris, France.
DAVIS, LYNDALL L.	524 Van Buren st., Chicago, Ill.
DEWEY, S. B.	Cleveland, Ohio.
DONNALLY, WMS.	1022 Fourteenth st., Washington, D. C.
*DOUGLASS, B.	Corner College st. and Omaha ave., Appleton, Wis.
DOYLE, B. OSCAR	206 Chestnut st., Louisville, Ky.
*DUNN, J. AUSTIN	31 Washington st., Chicago, Ill.
EDWARDS, C. G.	717 Fourth st., Louisville, Ky.
ESTERLY, C. E.	Lawrence, Kansas.
EVANS, GEORGE	49 W. Thirty-ninth st., New York City.
*FARRAR, J. N.	1271 Broadway, cor. Thirty-second st., New York City.
FAUGHT, L. ASHLEY	1415 Walnut st., Philadelphia, Pa.
FIELD, GEORGE L.	Abstract Building, Detroit, Mich.

FILLEBROWN, THOMAS	264 Boylston st., Boston, Mass.
FINLEY, M. F.	1928 I st., N. W., Washington, D. C.
d FISCHER, EDWIN	Trenton, N. J.
FLOYD, E. A.	Paola, Kansas.
FOSTER, M. W.	9 West Franklin st., Baltimore, Md.
*FREEMAN, ARTHUR B.	580 West Madison st., Chicago, Ill.
*FREEMAN, A. W.	1280 Venetian Building, Chicago, Ill.
*FREEMAN, S. A.	641 Main st., Buffalo, N. Y.
*FREEMAN, S.	965 Madison ave., New York City.
FRIEDRICHS, GEO. J.	155 St. Charles st., New Orleans, La.
FULLER, A. H.	Columbia Building, Eighth and Locust sts., St. Louis, Mo.
*FUNDENBURG, W. F.	950 Penn ave., Pittsburg, Pa.
*FUNDENBURG, W. H.	950 Penn ave., Pittsburg, Pa.
GARDINER, FRANK H.	31 Washington st., Chicago, Ill.
GASKILL, J. HOWARD	1313 Arch st., Philadelphia, Pa.
*GAYLORD, EDWARD S.	632 Chapel st., New Haven, Conn.
*GILMER, THOMAS L.	155 Thirty-third st., Chicago, Ill.
*GILSON, A. H.	7 Temple Place, Boston, Mass.
*GODDARD, C. L.	406 Sutter st., San Francisco, Cal.
d GRAY, J. P.	24 Berry Block, Church st., Nashville, Tenn.
*GRISWOLD, W. E.	401 Mack Building, Denver, Col.
GUILFORD, S. H.	1628 Chestnut st., Philadelphia, Pa.
*HACKER, T. S.	28½ East Ohio st., Indianapolis, Ind.
HARDY, C. S.	Summit, N. J.
HARLAN, A. W.	Masonic Temple, Chicago, Ill.
*HARROUN, C. H.	309 Superior st., Toledo, Ohio.
HARVEY, H. T.	44 Euclid ave., Cleveland, Ohio.
*HAWES, EARL P.	88 Westminster st., Providence, R. I.
*HAYWARD, T. T.	Oneida Building, Minneapolis, Minn.
*HEAD, JOSEPH	1415 Walnut st., Philadelphia, Pa.
HINDSLEY, F.	Bridgeport, Conn.
HINKINS, J. E.	131 Fifty-third st., Chicago, Ill.
HINMAN, THOMAS P.	Atlanta, Ga.
d HITCH, D. M.	Laurel, Del.
HOFF, N. S.	Ann Arbor, Mich.
HOLBROOK, C. W. F.	Milton Park, Newark, N. J.
HOLLAND, FRANK	Atlanta, Ga.
*HOLMES, E. S.	103 Ottawa st., Grand Rapids, Mich.
*HORTON, W. P.	106 Euclid ave., Cleveland, Ohio.
HOW, W. STORER	Chestnut st., cor. Twelfth st., Philadelphia, Pa.
*HOYSRADT, G. W.	Ithaca, N. Y.
d HULL, HENRY A.	New Brunswick, N. J.
*HUNT, A. O.	Iowa City, Iowa.
*HUNT, P. G. C.	Journal Building, Indianapolis, Ind.

HUNT, GEORGE EDWIN	Journal Building, Indianapolis, Ind.
HURLBUT, J. S.	Springfield, Mass.
*INGERSOLL, L. C.	Keokuk, Iowa.
JACK, LOUIS	1533 Locust st., Philadelphia, Pa.
JACKMAN, W. T.	106 Euclid ave., Cleveland, Ohio.
JACKSON, V. H.	240 Lenox ave., New York City.
JACKSON, H. H.	317 Jefferson ave., Detroit, Mich.
JEFFERIS, C. R.	908 King st., Wilmington, Del.
*JOHNSON, C. N.	31 Washington st., Chicago, Ill.
*JENISON, M. G.	608½ Nicollet ave., Minneapolis, Minn.
JONES, VICTOR S.	Bethlehem, Pa.
*KEECH, E. P.	525 North Charles st., Baltimore, Md.
*KEITH, H. H.	3140 Olive st., St. Louis, Mo.
*KELLEY, D. E.	Ashtabula, Ohio.
KING, H. T.	Fremont, Neb.
*KIRK, EDWARD C.	1807 Chestnut st., Philadelphia, Pa.
*KNAPP, J. ROLLO	103 Canal st., New Orleans, La.
*KNOWLES, SAMUEL E.	S. E. cor. Post and Stockton sts., San Francisco, Cal.
KULP, W. O.	Davenport, Iowa.
LATHROP, J.	271 Woodward ave., Detroit, Mich.
*LETORD, J. S.	548 Main st., Kansas City, Mo.
*LITCH, WILBUR F.	1507 Walnut st., Philadelphia, Pa.
LUCKEY, B. F.	Paterson, N. J.
*LUDWIG, R. F.	125 State st., Chicago, Ill.
*LYONS, L. W.	916 Pioneer Press Building, St. Paul, Minn.
*MCCANDLESS, A. W	126 State st., Chicago, Ill.
MCFADDEN, H. B.	3505 Hamilton st., Philadelphia, Pa.
MCKELLOPS, H. J.	2603 Washington ave., St. Louis, Mo.
*MCMANUS, HENRY	32 Pratt st., Hartford, Conn.
MCMANUS, JAMES	32 Pratt st., Hartford, Conn.
*MCQUILLEN, DANIEL N.	1628 Chestnut st., Philadelphia, Pa.
MAERCKLEIN, B. G.	Iron Block, Milwaukee, Wis.
MAERCKLEIN, ROBERT	423 Milwaukee st., Milwaukee, Wis.
MARSHALL, JOHN S.	Room 1012, Venetian Building, Chicago, Ill.
MEEKER, C. A.	29 Fulton st., Newark, N. J.
*MENG, JOHN W.	Lexington, Mo.
MOLYNEAUX, GRANT	S. E. cor. Seventh and Elm sts., Cincinnati, O.
*MONFORT, J. B.	Fairfield, Iowa.
MOORE, J. HALL	104 N. Ninth st., Richmond, Va.
MOORE, T. T.	Columbia, S. C.
MORGAN, HENRY W.	211 North High st., Nashville, Tenn.
MORGAN, WM. H.	211 North High st., Nashville, Tenn.
MORRISON, P. H.	1401 Washington ave., St. Louis, Mo.

*Morrison, W. N.	1401 Washington ave., St. Louis, Mo.
Newby, Jas. B.	2640 Washington ave., St. Louis, Mo.
Noble, H. B.	600 Thirteenth st., Washington, D. C.
*Northrop, A. L.	57 West Forty-ninth st., New York City.
*Noyes, Edmund	65 Randolph st., Chicago, Ill.
Ottofy, Louis	1228 Masonic Temple, Chicago, Ill.
*Page, W. E.	16 Arlington st., Boston, Mass.
*Palmer, Corydon	Warren, Ohio.
*Palmer, J. W.	Fitchburg, Mass.
Palmer, Stewart B.	39½ Warren st., Syracuse, N. Y.
*Patrick, J. J. R.	Belleville, Ill.
Patterson, J. D.	Keith & Perry Building, Kansas City, Mo.
Peabody, Francis	301 West Chestnut st., Louisville, Ky.
d Peach, Henry	441 Wabash ave., Chicago, Ill.
Peirce, C. N.	1415 Walnut st., Philadelphia, Pa.
*Perry, S. G.	46 W. Thirty-seventh st., New York City.
*Priest, A. N.	286 Genesee st., Utica, N. Y.
Prosser, A. J.	1605 Olive st., St. Louis, Mo.
*Pruyn, Chas. P.	70 Dearborn st., Chicago, Ill.
*Remington, F. A.	57 W. Forty-ninth st., New York City.
Rhein, Meyer L.	104 East Fifty-eighth st., New York City.
Rich, John B.	619 Fourteenth st., Washington, D. C.
*Roberts, Norman J.	Waukegan, Ill.
*Rohland, C. B.	123 Third st., Alton, Ill.
d Royce, E. A.	721 Washington Boulevard, Chicago, Ill.
Sanger, R. M.	557 Main st., East Orange, N. J.
Seip, Howard S.	Allentown, Pa.
*Shepard, L. D.	330 Dartmouth st., Boston, Mass.
*Shryock, W. W.	27 West Berry st., Fort Wayne, Ind.
*Shulze, W. H.	Atchison, Kan.
Sibley, A. H.	800 N. Sixteenth st., Philadelphia, Pa.
Sill, Charles	301 West Twelfth st., New York City.
*Sitherwood, Geo. D.	118 West Washington st., Bloomington, Ill.
Smith, B. Holly	1007 Madison ave., Baltimore, Md.
Smith, D. D.	1629 Walnut st., Philadelphia, Pa.
*Smith, Dwight	55 East Forty-seventh st., New York City.
*Smith, Eugene H.	383 Dartmouth st., Boston, Mass.
Smith, H. A.	128 Garfield Place, Cincinnati, Ohio.
Smith, H. T.	128 Garfield Place, Cincinnati, Ohio.
*Smith, Marvin E.	163 State st., Chicago, Ill.

*SOUTHWICK, A. P.	11 Niagara St., Buffalo, N. Y.
STAINTON, C. W.	47 North Pearl st., Buffalo, N. Y.
STARR, A. R.	164 East Ninety-first st., New York City.
*STEBBINS, E. A.	Shelburne Falls, Mass.
STEPHAN, J. T.	29 Euclid ave., Cleveland, Ohio.
*STEVENS, B. Q.	Hannibal, Mo.
*STOCKTON, C. S.	15 Cedar st., Newark, N. J.
*STRAIGHT, MILTON B.	80 West Huron st., Buffalo, N. Y.
*STUBBLEFIELD, D. R.	Wilcox Building, Nashville, Tenn.
*SUDDUTH, W. X.	329 Delaware ave., S. E., Minneapolis, Minn.
SUTPHIN, HERBERT S.	24 East Kinney st., Newark, N. J.
*SWAIN, E. D.	65 Randolph st., Chicago, Ill.
TAFT, J.	12 Berkshire Building, Cincinnati, O.
*TAYLOR, L. C.	26 Pratt st., Hartford, Conn.
THOMAS, J. D.	912 Walnut st., Philadelphia, Pa.
THOMPSON, HENRY C.	113 Pennsylvania ave., Washington, D. C.
d THOMPSON, JOHN S.	Atlanta, Ga.
TRUMAN, JAMES	3243 Chestnut st., Philadelphia, Pa.
TURNER, V. E.	107½ Fayetteville st., Raleigh, N. C.
TWILLEY, W. S.	309 North Eutaw st., Baltimore, Md.
VAN DE WATER, J. N.	Madison, N. J.
VAN VLECK, CHARLES K.	636 Warren st., Hudson, N. Y.
WALKER, WM. WALLACE	58 West Fiftieth st., New York City.
*WASSALL, J. W.	208 Dearborn st., Chicago, Ill.
WATERS, T. S.	756 North Eutaw st., Baltimore, Md.
*WATERS, GEORGE F.	6 Somerset st., Boston, Mass.
WATKINS, S. C. G.	Montclair, N. J.
WEEKS, THOS. E.	608½ Nicollet ave., Minneapolis, Minn.
*WENDELL, W. C.	107 Wisconsin ave., Milwaukee, Wis.
*WHITSLAR, W. H.	29 Euclid ave., Cleveland, Ohio.
*WILLIAMS, JACOB L.	1 Mt. Vernon st., Boston, Mass.
*WILSON, I. P.	Burlington, Iowa.
*WINDER, R. B.	716 Park ave., Baltimore, Md.
*WOLF, J. L.	1313 Newport ave., Washington, D. C.
*YOUNG, H. NEWTON	Wilkes-Barre, Pa.

Any inaccuracies in the above list in name or location should be reported to the Treasurer at once, in order that the necessary corrections may be made.

Annual dues being payable in advance, no name appears on the above list except those who have paid for 1894, and the Transactions are not sent to any who have not fully paid their dues.

Dues must be paid to the Treasurer. Send draft, P. O. money order, or express order.

HENRY W. MORGAN, *Treasurer*, 211 North High st., Nashville, Tenn.

On motion, the reading of the printed minutes was dispensed with.

The minutes *ad interim* were then read and approved.

MINUTES *AD INTERIM.*

The following communication was received from the Executive Committee on May 23, 1893 :

CHICAGO, May 23, 1893.

DR. GEO. H. CUSHING, *Recording Secretary Am. Dent. Asso.*

Dear Sir,—By unanimous vote of the Executive Committee of the American Dental Association, the time for holding the meeting this year has been changed to August 12, so as not to conflict with the meeting of the Columbian Dental Congress.

You will therefore publish notice in accordance with this change.

Yours very truly,

J. N. CROUSE, *Chairman of Executive Committee.*

Notice was given of the meeting in accordance with the above instructions.

GEO. H. CUSHING, *Recording Secretary.*

The unpublished minutes of the session of 1893 were then read and approved, as follows:

The American Dental Association commenced its Thirty-third Annual Session in Kindergarten Hall, 10 Van Buren street, Chicago, at 10 o'clock A.M., Saturday, August 12, 1893 ; the President, Dr. J. D. Patterson, in the chair.

On motion, the roll-call was dispensed with.

Dr. Crouse, Chairman of the Executive Committee, explained the reasons for the change of the time of meeting, whereupon Dr. Northrop offered the following resolution, which was unanimously adopted :

WHEREAS, The date for holding the Columbian Dental Congress was changed since our meeting last year, when the day for our present session was, by unanimous vote, fixed for August 15, with the understanding that the day selected was the one preceding the opening of the Congress :

Therefore Resolved, That the unanimous action of the Executive Committee in calling the meeting in advance of the day selected be hereby approved and declared to be legal and binding.

The Executive Committee then offered the following as their report :

WHEREAS, It has been generally understood by the members that the meeting of the Association this year should be as nearly as possible a formal one so that it complied with the requirements of the Constitution, to the end tha

the more interest and work should be concentrated upon the Columbian Dental Congress; therefore,

Resolved, That the dues for the coming year be remitted, and the Treasurer be instructed to give receipts in such form that the two years shall for that purpose be considered as one year;

Resolved, That the meeting this year be adjourned without any election of officers, as the effect of such non-election will be, under the Constitution, to make all officers hold over;

Resolved, That all records and transactions of this year be considered and published as merged in the proceedings of 1894, so that in spirit and name officers elected for one year shall not be considered to have held office for two years;

Resolved, That the Treasurer be instructed to pay all properly authenticated bills;

Resolved, That Old Point Comfort be selected as the place of meeting in 1894.

The report was received and action taken upon the resolutions separately.

The first, second, third, and fourth resolutions were unanimously adopted.

To the fifth, Dr. Taft moved to amend by naming Lookout Mountain for the place of next meeting.

Dr. Shepard moved as a substitute to the original resolution and the amendment, That nominations for the place of next meeting be made in the usual manner and the choice be decided by ballot. Carried.

Nominations were: Old Point Comfort, Lookout Mountain, San Francisco, Niagara Falls, and Saratoga.

The ballot being taken, it was found that fifty-nine votes had been cast. Necessary to a choice thirty.

Old Point Comfort received forty-five votes and was declared the place of next meeting.

On motion, it was ordered to omit all reports of standing committees and officers till next year.

On motion, adjourned to meet at Old Point Comfort the first Tuesday in August, 1894.

GEORGE H. CUSHING, *Secretary.*

The Executive Committee made a verbal report and presented the printed programme. The hour for evening sessions was changed to 8 P.M., and the report as thus amended was adopted.

The Publication Committee made the following report:

CHICAGO, August 12, 1893.

The Publication Committee would respectfully report that the Executive Committee arranged with The S. S. White Dental Manufacturing Company to publish the Transactions upon the same terms as before, and under Mr. Hise's care and attention they appeared in the same faultless form as usual.

For some inscrutable reason their issue was delayed beyond the usual time, they not being mailed until April 12. They were distributed to those entitled to receive them, and there are on hand about seventy-five copies.

The back numbers of the Transactions had accumulated to such a degree that the Committee was unanimous in the opinion that all but eight copies of the years previous to 1890 should be distributed among members of the profession who were not members of the Association, and The S. S. White Dental Manufacturing Company and the Wilmington Dental Manufacturing Company kindly undertook to send them out to their customers.

It is obviously unnecessary to keep a larger number on hand except for two years after each issue, and your Committee would recommend that they be distributed in the future on this plan.

RECEIPTS AND EXPENDITURES.

Received:		
From Treasurer	$58 00	
" sale of Transactions	3 00	
		$61 00
Expended:		
For expressage, paper, copying, and stationery	$18 40	
Postage	15 50	
Affidavit for Dr. Rich	75	
Printing, Knight & Leonard	7 25	
Engrossing John Allen Memorial	6 50	
Repacking books and storage	13 00	
Cartage books to dental depots	1 50	
	62 90	
1894. Postage, notices, etc	4 00	
Stationery	1 00	
		$67 90
Balance due the Publication Committee		6 90
Balance due from Committee last year		5 85
Due Publication Committee at this time		$1 05

GEO. H. CUSHING, *Chairman.*

Correct:

H. A. SMITH,
V. H. JACKSON, } *Auditing Committee.*

The Treasurer's report was then read, as follows:

TREASURER'S REPORT.

CHICAGO, ILL., August 12, 1893.

THE AMERICAN DENTAL ASSOCIATION IN ACCOUNT WITH A. H. FULLER, TREASURER.

By balance on hand August 2, 1892	$1210 07	
" rent of hall room at Niagara	185 00	
" dues received to date	1245 00	
Total		$2640 07

DISBURSEMENTS.

Alonzo Boice, printing, postage, and envelopes	$11 25	
J. N. Crouse, Chairman Executive Committee, sundries	208 75	
L. Ottofy, printing	2 50	
Geo. H. Cushing, Secretary's salary	200 00	
" " reporter's salary	125 00	
A. H. Fuller, Treasurer's salary	100 00	
World's Columbian Exposition	500 00	
M. O. Cooley, local committee	8 20	
John B. Rich, per resolution	53 25	
Rent of hall	250 00	
Postage, etc., Treasurer	4 50	
J. J. R. Patrick, Section VI	100 00	
Geo. H. Cushing, Chairman Publication Committee	58 00	
The S. S. White Dental Manufacturing Co., binding, etc.	79 45	
Dues returned, F. M. Odell	5 00	
Total		$1705 90
Balance on hand		$934 17

A. H. FULLER, *Treasurer.*

FORTRESS MONROE, VA., August 7, 1894

THE AMERICAN DENTAL ASSOCIATION IN ACCOUNT WITH A. H. FULLER, TREASURER.

By balance on hand August 12, 1893	$934 17	
" dues received to date	555 25	
Total		$1489 42

DISBURSEMENTS.

Geo. H. Cushing, Secretary's salary	200 00	
A. H. Fuller, Treasurer's salary	100 00	
Rent of Kindergarden Hall	20 00	
Stamps and envelopes (Treasurer)	10 00	
Total		$330 00
Balance on hand		$1159 42

A. H. FULLER, *Treasurer.*

Your Auditing Committee would respectfully report that they have examined the accounts of the Secretary and Treasurer, and found them correct as reported.

H. A. SMITH,
V. H. JACKSON, } *Auditing Committee.*

The following official communication was read by the Secretary :

INDIANAPOLIS, June 30, 1894.

DR. GEORGE H. CUSHING,

Secretary American Dental Association, Chicago, Ill.

Dear Sir,—Dr. Junius E. Cravens, of Indianapolis, Ind., was expelled from the Indiana State Dental Association, Thursday, June 28, 1894, for violation of the Code of Ethics. Very respectfully,

G. E. HUNT,
Secretary Indiana State Dental Association.

Dr. Thomas, of Philadelphia, presented the following preamble and resolutions, which were adopted :

FORTRESS MONROE, VA., August 4, 1894.

Mr. President,—I desire to call the attention of the members of the Association to the fact that in December next occurs the fiftieth anniversary of the discovery of anesthesia by Horace Wells. There have been resolutions passed by societies in different sections of the country looking to the proper celebration of the event. In February last, the Odontological Society of Pennsylvania adopted such resolutions and appointed a committee of five to take charge of the affair.

Since then the idea has prevailed that the occurrences of 1844 were matters of too great importance to be confined to the limit of local societies, and that we should all join in making a national celebration worthy of the event ; one that would for all time settle the controversy as to whom belongs the honor of the great discovery, and that will stamp indelibly upon the minds of the world that to Horace Wells belongs the honor, and through him to the dental profession of America. With this object in view, we in Philadelphia formed a plan of holding a meeting at which would be presented papers, one upon nitrous oxid, one upon the history of anesthesia, and one upon anesthesia in its application to surgery and its benefits to mankind. In addition to which addresses at a banquet should be included in a memorial volume which would be a most complete symposium of what is known upon the subject to-day.

With this object in view, I ask permission to offer the following resolution.

Very respectfully, J. D. THOMAS.

WHEREAS, in December, 1894, occurs the fiftieth anniversary of the discovery of anesthesia by Horace Wells, of Hartford, Conn. :

Resolved, That it is considered appropriate to publicly celebrate the event ;

Resolved, That a committee of nine be appointed to consider the matter and report to this meeting.

The following committee was appointed: J. D. Thomas, chairman; Thos. Fillebrown, J. Taft, Jas. McManus, W. H. Morgan, W. C. Barrett, A. W. Harlan, H. J. McKellops, Thos. E. Weeks.

On motion, a committee of three, as follows, was appointed to examine, in conjunction with a similar committee from the Southern Dental Association, the books of the Dental Protective Association: H. A. Smith, Louis Jack, and C. E. Esterly.

Dr. Harlan moved that a telegram of congratulation be sent to the American Dental Society of Europe. Carried.

Dr. McManus then offered the following, which was adopted:

WHEREAS, Papers printed in the magazines of the day are calculated to mislead the public as to the facts in regard to the discovery of anesthesia:

Resolved, That the American Dental Association places itself on record, as it did in 1864, by affirming that the late Dr. Horace Wells, of Hartford, Connecticut, is entitled to the honor and credit of the discovery. The justice of Dr. Wells's claim was established by an official investigation before a committee of Congress.

The testimony taken at this investigation is published in a work on "Modern Anesthesia," published in 1859 and 1867 by the late Hon. Truman Smith, United States Senator from Connecticut.

The resignation of Dr. M. G. Jenison, of Minneapolis, was read and accepted.

Dr. Crouse made a verbal statement of the status of litigation being prosecuted by the Dental Protective Association.

On motion of Dr. Bogue,—

Resolved, That members of dental societies in good standing, and physicians who are present, be invited to the privileges of the floor;

Also, that Dr. W. St. George Elliott, recently of London, England, be invited to the privileges of the floor.

The Committee on Necrology was filled by the appointment of Drs. Peirce and McKellops.

The First Vice-President, Dr. Crawford, then took the chair, and the President, Dr. Patterson, read the Annual Address, which, on motion, was referred to the following committee: Drs. Abbott, Crenshaw, and Brophy.

Adjourned to 8 P.M.

FIRST DAY—EVENING SESSION.

The Association was called to order at 8 P.M., the President in the chair.

The minutes of the morning session were read and approved.

Under the head of miscellaneous business the Treasurer, on motion, was instructed to pay all properly authenticated bills.

Dr. Walker, Chairman of the Executive Committee of the World's Columbian Dental Congress, offered a report, through the Treasurer, showing the sources from which the money for the Congress had been derived, and asked for some suggestions as to means to raise money to cover the deficit.

WORLD'S COLUMBIAN DENTAL CONGRESS.

Treasurer's report March 23, 1891, to August 1, 1894.

JOHN S. MARSHALL, *Treasurer.*

American Dental Association	$500 00
Alabama	130 00
Arizona	20 00
Arkansas	20 00
California	558 00
Canada	10 00
Chili	10 00
China	30 00
Colorado	40 00
Connecticut	210 00
Cuba	10 00
Delaware	40 00
District of Columbia	235 00
England	50 00
Florida	20 00
France	100 00
Germany	10 00
Georgia	115 00
Hawaiian Islands	40 00
Illinois	2820 00
Indiana	355 00
Iowa	460 00
Iowa State Dental Society	100 00
Italy	10 00
Amount carried forward	$5893 00

Amount brought forward	$5893 00
Kansas	130 00
Kentucky	110 00
Louisiana	60 00
Maine	190 00
Maryland	250 00
Massachusetts	395 35
Mexico	20 00
Michigan	235 00
Miscellaneous	11 70
Minnesota	385 00
Mississippi	40 00
Missouri	715 00
Montana	10 00
Nebraska	180 00
New Jersey	450 00
New York	1455 30
New South Wales	30 00
New Hampshire	10 00
North Carolina	210 25
North Dakota	40 00
Ohio	784 00
Oregon	20 00
Paraguay	20 00
Pennsylvania	780 30
Rhode Island	25 00
Russia	30 00
Scotland	10 15
Southern Dental Association	200 00
South America	10 00
South Carolina	130 00
South Dakota	10 00
Spain	20 00
Switzerland	20 00
Tennessee	280 00
Texas	170 00
Vermont	120 00
Virginia	100 00
Washington	80 00
West Virginia	10 00
Wisconsin	150 00
Total receipts	$13,790 05
From Columbia National Bank	249 74
Total	$14,039 79

Total disbursements	$10,168 96
Columbia National Bank	249 74
" " " deficit	163 41
Total	$10,582 11
Balance in Merchants' Loan and Trust Co.	3,457 68
Total	$14,039 79

This does not include the expenses of the Executive Committee for railroad travel and hotel bills, which amount to over $4000, and which have been cheerfully donated to the Congress.

The amount subscribed to the Congress will not be sufficient to meet the expenses by at least $1000. The Executive Committee must therefore call upon the profession for further contributions to meet this deficit.

There are still in the hands of the Treasurer a considerable number of the memorial medals, which members of the Congress can have by making a further subscription of $10 each. The medal is a beautiful work of art, in bronze, and is a most valuable souvenir of the most interesting dental congress ever held in the history of the world.

All of which is respectfully submitted.

JOHN S. MARSHALL, *Treasurer.*

Dr. H. A. Smith moved that the Association appropriate five hundred dollars for this purpose, if in the opinion of the Executive Committee it is deemed advisable. Carried.

Section I was then called, and the Chairman, Dr. Sanger, read its report.

Dr. W. M. Sharp, of Binghamton, then gave a demonstration of the Sharp porcelain furnace. Discussed by Dr. D. D. Smith.

Dr. George Evans then demonstrated his method of making hollow gold molar and bicuspid dummies, and collar or ferrule crowns in which no gold is exposed at the cervico-labial portion. Discussed by Drs. R. R. Freeman, C. Sill, Gardiner, Crouse, and Brophy.

Dr. Daly's method of lining with gold, vulcanized rubber plates, was presented by Dr. H. B. Noble, of Washington, D. C.

Dr. St. George Elliott described a new method of vulcanizing rubber between metal.

Dr. Custer explained his method of melting platinum by the electric current.

Dr. Bogue, of New York, described a hydraulic press for swaging. Discussed by Drs. Butler and Elliott.

Dr. Barber, of Toledo, Ohio, described a method of swaging with shot.

Adjourned to meet at 9 A.M. to-morrow.

SECOND DAY—MORNING SESSION.

The Association was called to order by the President at 10.10 A.M.

The minutes of the evening session were read and approved.

Under miscellaneous business, the Auditing Committee reported that they had examined the reports of the Treasurer and of the Secretary and found them correct.

The Credentials Committee made a partial report, which was eventually completed as follows:

REPORT OF COMMITTEE ON CREDENTIALS.

Atlanta Dental College—Wm. Crenshaw.
American College of Dental Surgery—Henry Peach.
Chicago Dental Society—Frank H. Gardiner.
Connecticut State Dental Association—Frederic Hindsley.
Delaware State Dental Society—D. M. Hitch.
Dental Department of Southern Medical College—Frank Holland.
Illinois State Dental Society—Frank H. Gardiner.
Kansas State Dental Association—C. E. Esterly.
Missouri Dental College—A. H. Fuller.
New Jersey State Dental Society—Chas. A. Meeker, Herbert S. Sutphin, F. C. Barlow, Chas. W. F. Holbrook, Henry A. Hull, W. G. Chase, Chas. S. Hardy, J. N. Van de Water, Edwin Fischer.
Northern Ohio Dental Association—H. L. Ambler.
Odontological Society of Chicago—E. A. Royce.
Odontological Society of Pennsylvania—L. Ashley Faught, Alonzo Boice.
Pennsylvania College of Dental Surgery—C. N. Peirce.
Pennsylvania State Dental Society—L. Ashley Faught, Alonzo Boice.
Philadelphia County Dental Society—L. Ashley Faught.
Philadelphia Dental College—S. H. Guilford.
St. Louis Dental Society—J. B. Newby.
Society of the Alumni, Department of Dentistry, University of Pennsylvania—H. B. McFadden, V. S. Jones.
Southern Dental Association—Thomas P. Hinman, John S. Thompson.
Washington City Dental Society—M. F. Finley.

Section I, the regular order, was then resumed, and Dr. V. H. Jackson read a paper on Orthodontia. Discussed by Drs. Rhein, Holly Smith, Crawford, W. H. Morgan, and Kulp.

Dr. Crouse described an automatic pump.

Section II was then called, and Dr. Ottofy, the Chairman, read its report, which was discussed by Drs. Abbott, St. George Elliott, W. H. Morgan, Bogue, Crouse, Taft, Truman, Marshall, Kulp, Moore, McKellops, and Catching.

The hour for the organization of Sections having arrived, they were organized as follows :

ORGANIZATION OF SECTIONS.

SECTION I. Prosthetic Dentistry, Metallurgy, and Chemistry.—R. M. Sanger, chairman; Alonzo Boice, secretary; A. W. McCandless, T. S. Waters, W. S. How, W. T. Jackman, J. Rollo Knapp, Wm. H. Shulze, Howard S. Seip, J. N. Crouse, E. S. Gaylord, Geo. Evans, V. H. Jackson, L. E. Custer, C. R. Jefferis, W. H. Fundenberg, J. E. Hinkins, A. O. Hunt, F. C. Barlow, S. A. Freeman, C. E. Esterly, H. S. Sutphin, M. L. Chaim, L. L. Barber, H. H. Boswell, H. J. Burkhart, Henry Cowie, Jas. Cleland, Wm. Conrad, C. S. Case, Henry S. Colding, D. E. Coulson, M. B. Culver, C. C. Carroll, H. J. Cole, W. G. Clark, M. O. Cooley, W. G. Chase, A. H. Gilson, P. G. C. Hunt, F. O. Hetrick, T. S. Hacker, W. P. Horton, T. T. Hayward, C. B. Hewitt, H. L. Harvey, Joseph Head, John G. Harper, Thos. P. Hinman, Frederic Hindsley, Joseph Lathrop, H. S. Lowry, J. S. Letord, L. C. LeRoy, L. W. Lyon, W. N. Morrison, Grant Molyneaux, Grant Mitchell, J. W. Palmer, C. J. Peterson, E. H. Pease, F. A. Remington, C. B. Rohland, Jessie M. Ritchie, John B. Rich, D. R. Stubblefield, Dwight Smith, A. P. Southwick, J. F. Stephan, E. S. Talbot.

SECTION II. Dental Education, Literature, and Nomenclature.—Louis Ottofy, chairman; S H. Guilford, secretary; J. Taft, C. N. Peirce, C. Sill, Frank Abbott, H. B. Noble, T. E. Weeks, Louis Jack, M. F. Finley, Henry Barnes, N. S. Hoff, C. W. Stainton, Chas. D. Cook, E. A. Bogue, Jacob L. Williams, E. P. Keech, A. H. Thompson, J. H. Gaskill, J. N. Farrar, E. C. Kirk, C. P. Pruyn, B. F. Luckey, A. O. Hunt, J. Hall Moore, E. A. Floyd, C. L. Goddard, W. O. Kulp, S. B. Brown, C. R. Butler, Wm. Crenshaw, Chas. E. Dunn, L. L. Davis, B. Douglass, B. Oscar Doyle, G. C. Daboll, Wms. Donnally, J. Austin Dunn, S. B. Dewey, Frank Holland, H. H. Jackson, Henry W. Morgan, B. G. Maercklein, T. T. Moore, E. Noyes, Jas. B. Newby, L. D. Shepard, E. D. Swain, D. R. Stubblefield, Chas. S. Hardy.

SECTION III. Operative Dentistry.—Louis Jack, chairman; S. C. G. Watkins, secretary; B. F. Luckey, J. Hall Moore, W. H. Morgan, Jas. McManus, A. H. Fuller, H. L. Ambler, H. J. McKellops, D. D. Smith, W. H. Baird,

Henry Barnes, J. W. Wassall, J. B. Monfort, Corydon Palmer, W. E. Page, A. N. Priest, T. S. Waters, E. P. Keech, L. C. Taylor, H. B. Noble, W. W. Shryock, G. W. Hoysradt, B. Holly Smith, Howard S. Seip, C. Sill, E. S. Holmes, A. R. Starr, W. W. Walker, J. N. Crouse, S. E. Knowles, Chas. K. Van Vleck, Geo. F. Cheney, Eugene H. Smith, S. G. Perry, C. N. Johnson, C. H. Harroun, J. A. Libbey, Dwight M. Clapp, T. E. Weeks, B. Q. Stevens, W. H. Fundenberg, W. F. Fundenberg, A. J. Prosser, John W. Meng, J. S. Hurlbut, C. S. Stockton, Henry C. Thompson, C. E. Esterly, J. N. Van de Water, Earl P. Hawes, V. S. Jones, C. W. F. Holbrook, V. E. Turner, E. T. Darby, Geo. D. Sitherwood, A. E. Brown, E. Parmly Brown, W. R. Clifton, W. H. Dwinelle, C. G. Edwards, A. W. Freeman, Geo. L. Field, S. Freeman, A. G. Friedrichs, R. F. Ludwig, Henry W. Morgan, T. T. Moore, Chas. A. Meeker, Henry McManus, Daniel N. McQuillen, H. B. McFadden, A. L. Northrop, L. D. Shepard, Chas. S. Hardy.

SECTION IV. Histology and Microscopy.—Frank Abbott, chairman; L. L. Davis, secretary; I. P. Wilson, Geo. F. Waters, A. H. Thompson, Arthur B. Freeman, J. Edward Line, Carl T. Gramm, E. D. Swain, M. V. Toledo, C. A. Timme, W. S. Twilley, W. W. Vance, A. J. Volck, Samuel A. White, J. L. Wolf, J. W. Whipple, W. C. Wendell, H. Newton Young.

SECTION V. Materia Medica and Therapeutics.—J. S. Cassidy, chairman; Geo. E. Hunt, secretary; A. W. Harlan, Jas. Truman, F. H. Gardiner, N. S. Hoff, Wilbur F. Litch, M. W. Foster, Chas. S. Hardy.

SECTION VI. Physiology and Etiology.—J. D. Patterson, chairman; H. T. Smith, secretary; Louis Ottofy, W. C. Barrett, L. E. Custer, W. S. How, S. B. Palmer, Mrs. Emma Eames Chase, H. A. Smith, E. A. Bogue, Geo. F. Waters, John J. R. Patrick, A. H. Thompson, S. E. Knowles, W. P. Horton, L. Ashley Faught, Chas. B. Atkinson, S. B. Brown, Geo. J. Friedrichs, T. L. James, S. E. Johnston, H. H. Keith, G. Knepper, D. E. Kelly, H. T. King, F. J. Kingsley, C. V. Kratzer, John S. Marshall, Wm. J. Martin, W. X. Sudduth, M. B. Straight, J. A. Swasey, A. H. Sibley, M. E. Smith, P. T. Smith, E. E. Shattuck, H. H. Boswell.

SECTION VII. Anatomy, Pathology, and Surgery.—T. W. Brophy, chairman; J. D. Thomas, secretary; J. D. Patterson, Thos. Fillebrown, J. Y. Crawford, Robt. Maercklein, M. L. Rhein, Frank Abbott, W. C. Barrett, I. P. Wilson, L. C. Ingersoll, M. H. Cryer, N. J. Roberts, C. A. Brackett, B. Holly Smith, Howard S. Seip, A. R. Starr, E. A. Stebbins, W. H. Whitslar, Arthur B. Freeman, J. Edward Line, Carl T. Gramm, V. S. Jones, I. B. Davenport, J. Adams Bishop, A. E. Baldwin, G. L. Curtis, C. C. Chittenden, C. S. Case, T. L. Gilmer, W. E. Griswold, Chas. H. Goodrich, J. S. Marshall.

The report of the Committee on the President's Address was read, and the time for its consideration fixed at 8 P.M. to-night.

On motion, adjourned to 8 P.M.

SECOND DAY—EVENING SESSION.

The Association was called to order by President Patterson at 8.30 P.M.

The minutes of the morning session were read and approved.

Under miscellaneous business, Dr. Thomas, Chairman of the Committee on Anesthesia, reported as follows:

MR. PRESIDENT AND GENTLEMEN:

Your Committee upon Anesthesia would report that they have agreed upon the following motions:

First. That the Fiftieth Anniversary of the Discovery of Anesthesia by Horace Wells should be properly celebrated by the dental profession of America.

Second. That the celebration should comprise the presentation of two papers, one upon the "History of the Discovery of Anesthesia," and the other upon the "Application of Anesthesia to Surgery and its Benefits to Mankind;" and that Dr. Thomas Fillebrown, of Boston, Mass., be invited to present the paper upon the "History of Anesthesia," and that Dr. J. E. Garretson, of Philadelphia, Pa., be invited to present the one upon the "Application of Anesthesia to Surgery."

Third. That a banquet be given in honor of the event, at which prominent gentlemen shall be invited to make addresses, and that the papers and addresses, properly edited, shall be compiled and preserved in a memorial volume appropriate to the importance of the occasion.

Fourth. That after the claims and advantages of the cities of Hartford, Boston, Washington, New York, and Philadelphia had been presented and discussed, Philadelphia was unanimously selected as the place of meeting.

Fifth. That there be three committees appointed: an Organization Committee of nine, an Executive Committee of eleven, and a General Committee of fifty.

The following gentlemen were nominated upon the several Committees:

Committee upon Organization—J. D. Thomas, James McManus, H. J. McKellops, Thomas Fillebrown, A. W. Harlan, Thomas E. Weeks, J. Taft, W. H. Morgan, W. C. Barrett.

Executive Committee—J. D. Thomas, E. T. Darby, S. H. Guilford, D. N. McQuillen, E. C. Kirk, Louis Jack, C. N. Peirce, Philadelphia; A. L. Northrop, William Carr, New York; H. B. Noble, Washington, D. C.; James McManus, Hartford, Conn.

General Committee—Dana W. Fellows, Maine; James Lewis, Vermont; J. L. Williams, R. R. Andrews, Massachusetts; E. S. Gaylord, Connecticut; C. A. Brackett, Rhode Island; S. B. Palmer, S. G. Perry, O. E. Hill, W. W. Walker, New York; R. M. Sanger, C. A. Meeker, New Jersey; C. R. Jefferis, Delaware; J. A. Libbey, W. H. Fundenberg, Pennsylvania; B. Holly Smith, M. W. Foster, Maryland; J. H. Moore, Virginia; V. E. Turner, North Caro-

lina; T. T. Moore, South Carolina; J. H. Coyle, B H. Catching, Georgia; C. P. Robinson, Alabama; George B. Clements, Mississippi; G. J. Friedrichs, Louisiana; W. R. Clifton, Texas; A. H. Fuller, J. D. Patterson, Missouri; A. O. Hunt, Iowa; C. M. Baily, Minnesota; T. W. Brophy, G. V. Black, G. H. Cushing, Illinois; S. B. Brown, Indiana; J. S. Cassidy, F. Peabody, Kentucky; J. Y. Crawford, H. E. Beach, Tennessee; G. L. Field, Michigan; H. A. Smith, C. R. Butler, A. F. Emminger, Ohio; R. H. Thompson, Kansas; A. W. Nason, Nebraska; G. H. McCausey, Wisconsin; W. J. Younger, C. L. Goddard, E. L. Townsend, California; George H. Chance, Oregon; W. E. Burkhart, Washington.

All of which is respectfully submitted.

Dr. Boice moved that a committee of three be appointed to prepare a correct history of the classification of dentists by the Census Bureau. Discussed by Drs. Barber and Thomas, and carried.

The President appointed the following as that committee: Alonzo Boice, W. S. Twilley, and C. A. Meeker.

On motion of Dr. Harlan, the following was adopted:

Resolved, That two general addresses be delivered annually, on the second and third days' meetings, on some general topics of interest to the whole profession, the subjects to be selected by the third division of the Executive Committee, the first division of the Executive Committee to nominate the essayists annually.

The Committee on Necrology offered its report, which was adopted, and will be found on the memorial pages.

Dr. Jack reported for the Committee on State and Local Societies:

To the Officers and Members of the American Dental Association:

Your Committee beg to report that in the discharge of their function they formulated a series of questions to serve as topics for discussion by the local and state dental organizations throughout the country. The full text of these topics forms a part of the Transactions of the American Dental Association for 1892. A list of these topics was embodied in a printed circular letter and sent to the secretary of every dental society in the United States, so far as was possible. Although an important part of the plan was to secure reports of the discussions wherever obtainable, and a request was embodied in the circular letter asking each secretary to furnish such a report to the Chairman of your Committee, only one response to the request has been received, that one being from the Kansas State Society. Notwithstanding the failure to accomplish this feature of the original plan, your Committee are of the opinion that the idea of submitting a series of topics to the state and local societies upon the authority of the American Dental Association is a valuable one, and has already been productive of much good. The reports of transactions

of the dental societies of the United States, as they have appeared in our periodical literature, show that the interest in the plan is widespread, and that the topics promulgated by your Committee have furnished abundant material for study and discussion in a large number of local societies, especially among those which are actively alive to the importance of publishing their proceedings for the benefit of the profession at large.

In view of the value of this plan, so far as the limited experience in its working can at this time determine, it is the opinion of your Committee that the work should be still further pushed along the same lines, and to that end it would suggest that another series of topics be formulated and issued by your authority for the use of state and local societies during the coming year.

All of which is respectfully submitted for the Committee.

EDWARD C. KIRK, *Chairman.*

Dr. Brophy moved that the report be received and placed on file.

Dr. Harlan moved, as an amendment, that the report be adopted and the committee be continued with authority to issue another set of questions as before.

The amendment was accepted, and the motion as amended was carried.

The committee to examine the books of the Dental Protective Association reported as follows, the report being signed by Drs. Smith, Jack, and Esterly on the part of the committee appointed by the American Dental Association, and by Dr. Morgan on behalf of the committee from the Southern Dental Association :

Your Committee appointed to examine into the financial condition of the Dental Protective Association of the United States beg leave to report :

They have carefully examined the books and accounts of the Treasurer, Dr. J. N. Crouse, and find that all funds collected have been carefully accounted for, and all expenditures have been economically made in the direction only of the objects of the Association.

We also find the balance of money on hand has been invested, secured by mortgage on real estate. Your Committee, in justice to Dr. Crouse, would state that he has given much valuable time in carrying out the purposes of the Association, for which he has received no compensation.

H A SMITH,
LOUIS JACK,
HENRY W. MORGAN,
C. E. ESTERLY,
Committee.

Dr. Crouse was granted ten minutes to present some points regarding the Dental Protective Association.

The consideration of the report on the President's Address was then taken up by sections. The first proposition was as follows:

1. In order that the interest which formerly existed in the profession, generally, in the meetings of the Association may be revived, it would recommend that clinics, in both the surgical and prosthetic departments, be re-established.

It was discussed by Drs. Smith, of Florida, Welch, of New Jersey, Weeks, and Harlan.

Dr. Peirce moved to refer it to the Executive Committee.

On motion of Dr. Fillebrown, the whole matter was laid upon the table indefinitely.

The second suggestion as follows:

2. The suggestion as to the unification of the examinations in the several States, and the registration of certificates of those moving from one State to another without further examination, your Committee considers an excellent one, but impracticable so long as the different State Boards of Examiners are selected in the various ways in which they are at present. There is, in the estimation of your Committee, altogether too much politics in these as well as in other professional appointments.

Being taken up, Dr. Holly Smith moved that a committee of three be appointed to confer with similar committees from other societies in an effort to unify the dental laws of this country. Carried, and the President appointed as that Committee, B. Holly Smith, A. W. Harlan, J. Y. Crawford.

The third suggestion, as follows, was on motion adopted:

3. It is further suggested that the chairmen of the different Sections be instructed to urge that every member in his Section shall at each annual meeting of the Association have something, even though it be brief, in writing, to present, so that all, instead of a few, as is and has been complained of, may take an active part in the work of the Association.

The fourth suggestion being read as follows:

4. From what your Committee can learn of the workings of societies which have adopted the plan of having business transacted by an executive council, it is of the opinion that such a change in the management of the business of this Association would work an injury to it, from the fact that the charge would be made that a few men managed the business without the consent of or consultation with the Association as a body.

Dr. Patterson moved that this question be considered in connection with the report of the Committee on Revision of the Constitution at 3 P.M. to-morrow. Carried.

Section II was again taken up, and the discussion of its report was closed by Dr. Ottofy.

Under Section II, Dr. Guilford read a report on Nomenclature, and Dr. Rhein one on the Nomenclature of Pyorrhea Alveolaris.

Dr. Holly Smith moved that Dr. Guilford's suggestion as to the appointment of a committee be adopted and the committee be made a standing one. Carried.

The following resolution, which was adopted, embodies the suggestions of Dr. Guilford :

Resolved, That a standing Committee of nine be appointed, to be known as the Committee on Terminology, whose duty it shall be to prepare and submit a carefully prepared report at each annual meeting of this Association.

The President appointed the following as that Committee: S. H. Guilford, Chairman ; M. L. Rhein, T. E. Weeks, C. L. Goddard, Grant Mollyneaux, L. Ottofy, A. H. Thompson, D. R. Stubblefield, and E. C. Kirk.

On motion of Dr. Holly Smith, the suggestion of Dr. Guilford regarding Dr. Corydon Palmer's notation was referred to the Committee just appointed.

Dr. Abbott offered the following, which was referred to the Committee on the Unification of Dental Laws :

Resolved, That it is the sense of this Association that no State Board of Dental Examiners should examine any person for the practice of dentistry who is not a graduate of a dental college, nor grant temporary licenses to practice to undergraduates.

Adjourned till 9 A.M. to-morrow.

THIRD DAY—MORNING SESSION.

The Association was called to order by President Patterson at 10 A.M.

The minutes of the previous session were read and approved.

Under miscellaneous business, the Credentials Committee made a partial report.

The following, offered by Dr. Fillebrown, was adopted :

WHEREAS, A closer union of the members of the dental profession in the United States is desirable and would promote scientific and professional advancement :

Resolved, That a committee of five be appointed to confer with the Southern Dental Association in regard to the formation of one National Association.

The President appointed as that committee : Thos. Fillebrown, Chairman ; B. Holly Smith, Louis Jack, J. Y. Crawford, and J. N. Crouse.

The report of discussions of the Kansas State Dental Society was returned to the Committee on State and Local Societies for their use as reference.

Section III was called and passed.

Section IV was called, and its Chairman stated that there was no report.

Section V was called and passed.

Section VI was called. Its Chairman, Dr. H. A. Smith, reported a paper to be read by Dr. S. B. Palmer on Etiology, and that Dr. Patrick's report on the examination of pre-historic crania would be read by title and published in the Transactions. He then read the report of the Section.

Dr. S. B. Palmer then read his paper on "The Etiology of Dental Caries."

Pyorrhea was discussed by Drs. Peirce, Abbott, Crawford, Rhein, Marshall, Crouse, Noble, Morgan, Taft, and Harlan.

Under head of miscellaneous business, on motion of Dr. Taft, the following was adopted :

Resolved, That the following Committee of five be appointed to investigate the subject of pyorrhea alveolaris, with the view of ascertaining definitely, so far as practicable, its etiology, pathology, and the easiest principles of

treatment, and that they shall report to this body at its next annual meeting. To aid the work, the Committee is hereby authorized to draw on the Treasurer for funds to an amount not to exceed $75.00 : C. N. Peirce, J. S. Marshall, E. C. Kirk, M. L. Rhein, J. Taft.

Adjourned to 3 P.M.

THIRD DAY—AFTERNOON SESSION.

The Association met at 3 P.M., in accordance with the motion of yesterday to make the consideration of the report of the Committee on Revision of the Constitution the special business of this session; the President, Dr. Patterson, in the chair.

Dr. H. A. Smith moved that, in view of the fact that a committee has been appointed to confer with a like committee from the Southern Association looking toward a union of the two bodies in one National Association, the consideration of the revision of the Constitution be postponed till that committee has reported. Carried.

Adjourned till 8 P.M.

THIRD DAY—EVENING SESSION.

The Association was called to order by the President at 8.30 P.M.

The minutes of the morning and afternoon sessions were read and approved.

There being no miscellaneous business, Dr. Palmer's paper was discussed by Drs. Abbott, Marshall, Harlan, Crawford, Jack, Bogue, and Palmer. Subject was passed.

Section VII being called, the Chairman, Dr. Brophy, read the report. He then presented a paper by himself, describing a new operation for the removal of the inferior dental nerve. Discussed by Drs. Marshall, Crawford, Patterson, Cushing, and closed by Dr. Brophy.

A paper by W. N. Morrison on planting teeth was then read by his son, P. H. Morrison.

Adjourned to 9 A.M. to-morrow.

FOURTH DAY—MORNING SESSION.

The Association met at 10 A.M., the President in the chair.

The minutes of the preceding evening session were read and approved.

There being no miscellaneous business, Section III was called.

Dr. S. C. G. Watkins, in the absence of the Chairman and Secretary of the Section, read a brief report, which was discussed by Dr. Peirce.

Section V was then called.

Dr. Harlan, Chairman of the Section, read a report by its Secretary, Dr. Geo. E. Hunt, and followed with one written by himself. Dr. Cassidy presented verbally some facts about Formalin.

On motion, the subject was passed.

Dr. Boice asked that in Section I a paper by Dr. W. N. Morrison be read by title as follows: "Mechanical Dentistry,—Bridges."

At the request of Dr. Guilford, Dr. Gaskill, of Philadelphia, presented an unusual case in pathology. Dr. Jack described two similar cases. Discussed by Drs. Abbott, Marshall, Gaskill, Holly Smith, Palmer, Jack, Crawford, Ottofy, Moore, Peirce, Patterson, McKellops, Crouse, Guilford, and Brophy.

Dr. Foster presented the report of the Auditing Committee of the World's Columbian Dental Congress:

Mr. President,—The Auditing Committee appointed to audit the accounts of the Treasurer of the Columbian Dental Congress, beg leave to report the accounts and vouchers correct.

M. W. FOSTER,
H. B. NOBLE,
Committee.

The Executive Committee made the following report:

Meeting of Executive Committee held August 10, 1894.

The Committee sanction the appropriation of the $500 asked for by the Columbian Committee; with the proviso, that after bills and all necessary expenses are paid, the next money received from sale of Transactions shall reimburse the funds of the Association until this appropriation is fully cancelled.

In accordance with the resolution adopted that two addresses be delivered annually, on the second and third days of the meeting, on some topics of general interest to the profession, they have selected as the subjects for the next Annual Meeting, "Antiseptic Surgery," Dr. A. W. Harlan, Essayist; and "The Practice of Dentistry," Dr. Louis Jack, Essayist.

The Association then proceeded to the selection of place of next meeting and the election of officers.

The Executive Committee nominated as places for next meeting Asbury Park, San Francisco, and Niagara Falls. Colorado Springs was also nominated. On the first ballot Asbury Park received thirty-eight votes, which being a majority, the informal ballot was made formal and Asbury Park was declared selected.

On the informal ballot for President, Dr. J. Y. Crawford receiving fifty-three votes, the informal ballot was made formal and he was declared duly elected.

On the informal ballot for First Vice-President, Dr. S. C. G. Watkins having the majority, the informal ballot was made formal and he was declared elected.

There being no choice on the informal ballot for Second Vice-President, a formal ballot was taken, resulting in the election of Dr. Thomas Fillebrown, of Boston.

On motion and no objection being offered, the President was authorized to cast the ballot of the Association for Dr. George H. Cushing as Recording Secretary, and he was declared duly elected.

On the informal ballot for Corresponding Secretary, Mrs. Emma Eames Chase receiving a majority, the informal ballot was made formal and she was declared duly elected.

On the first ballot for Treasurer, no choice was made. It was then learned that Dr. Meeker, of New Jersey, one of the candidates, was not a member of the Association, whereupon Dr. James Truman moved to suspend the rules and that the Secretary be instructed to cast the vote of the Association for Henry W. Morgan, of Nashville. Objection being made, a formal ballot was ordered, resulting in the election of Dr. Morgan.

Drs. C. N. Peirce, H. A. Smith, and T. S. Waters were elected to the Executive Committee to serve for three years.

Dr. Louis Ottofy was elected a member of the Executive Committee to fill the unexpired term of Dr. G. W. McElhaney, deceased.

It was moved to close all business at this session. Carried.

Moved that a vote of thanks be extended to the railroads, steamboat companies, and hotels for the courtesy and consideration they have shown the Association. Carried.

On motion of Dr. Truman, a vote of thanks was extended to Dr. A. H. Fuller, the retiring Treasurer, for his very efficient services for many years past.

It was moved to proceed to the installation of the newly elected officers, previous to which ceremony the minutes were read and approved.

President Patterson appointed Drs. Guilford and Newby to escort the newly elected President to the chair, who briefly thanked the Association and invited them to a sail upon the bay.

The President then appointed Drs. Harlan and Darby on the Publication Committee.

On motion, the Secretary was instructed to organize Sections that had failed to do so for themselves.

The President appointed as Local Committee of Arrangements Drs. C. A. Meeker, Newark; C. S. Stockton, Newark; and Charles W. F. Holbrook, Newark.

The minutes were then read and approved, and the Association adjourned to meet at Asbury Park the first Tuesday in August, 1895.

GEORGE H. CUSHING, *Secretary.*

REPORT ON NECROLOGY.

FORTRESS MONROE, VA., August 7, 1894.

To the American Dental Association :

Your Committee on Necrology would respectfully report that it becomes its painful duty to report an unusually large list of those who have fallen from our ranks during the past two years.

As reported to us the list is as follows,—viz :

Dr. George Watt, of Xenia, Ohio.
Dr. W. W. Allport, of Chicago, Ill.
Dr. W. H. Eames, of St. Louis, Mo.
Dr. A. O. Rawls, of Lexington, Ky.
Dr. R. B. Winder, of Baltimore, Md.
Dr. Edgar Park, of St. Louis, Mo.
Dr. Alonzo P. Beale, of Philadelphia, Pa.
Dr. Ambrose Lawrence, of Boston, Mass.
Dr. J. Smith Dodge, of New York.
Dr. W. C. Wardlaw, of Atlanta, Ga.
Dr. J. H. Smith, of New Haven, Conn.
Dr. M. H. Dodge, of New York.
Dr. Fred. A. Levy, of Orange, N. J.
Dr. G. W. McElhaney, of Columbus, Ga.
Dr. G. A. Wells, of Indianapolis, Ind.

Of this number we find that two were for many years prominent members of this Association ; each of whom occupied at one time the highest office in the body,—viz, Drs. Geo. Watt and W. W. Allport. They were members of this Association in its earliest history, and always, during their lifetime, manifested a warm interest in it, and devoted much effort to its prosperity. It may truthfully be said that they both left an impress upon the profession, the result of which is so far-reaching that it can hardly be estimated.

Drs. W. H. Eames, R. B. Winder, and A. O. Rawls were devoted

and conspicuous educators. Dr. Eames for a large share of his professional life was thus engaged, and in this line did faithful work. Of high integrity and intense earnestness, he was in every sense of the word a true man. Dr. Winder, though engaged in educational matters during a much shorter time than Dr. Eames, accomplished a great work. He was a man of great energy, well versed in the study of human nature; hence exerting a marked influence upon those with whom he came in contact.

Dr. A. O. Rawls, in his career as a teacher, was eminently successful. A man of intense personality and earnestness, in his contact with men he of necessity became a leader. Drs. Park, Beale, Lawrence, J. Smith Dodge, Wardlaw, Smith, M. H. Dodge, Levy, McElhaney, and Wells, were men of prominence in the profession in their localities, and we feel that the profession and the communities in which they lived have sustained irreparable loss.

J. TAFT,
C. N. PEIRCE,
H. J. MCKELLOPS,
LOUIS JACK,
FRANK ABBOTT,
Committee.

ADDRESS OF WELCOME.

By H. WOOD CAMPBELL, President Virginia State Dental Association.

MR. PRESIDENT AND GENTLEMEN OF THE AMERICAN DENTAL ASSOCIATION:

We feel highly honored to-day to welcome this body of scientific and representative dentists to the State of Virginia. While you are within our borders, gentlemen, we desire to extend to you all the hospitality and courtesy within our power, and to make your stay among us a pleasant remembrance when your minds revert to Virginia and Old Point.

We recognize your ability as scientific men. We are glad to shake your hand, to look you in the eye, and feel the heart-throb of this great Association. I am sure that I voice the sentiments of every member of the Virginia Dental Association when I say that our hearts' best wishes are for you and your noble work for our common profession. You are not strangers to us. We have known you and recognized your work for the good of dentistry for many years, and since you have numbered among your membership some of the Virginia Association's most honored sons, we feel that a kinship exists between us, and it is our desire that this may lead to a more intimate association and fellowship.

We are glad to meet with you on this historic spot, around which so much of vital importance to our great country has transpired, where so many stirring scenes have been enacted that will make the names of our great countrymen—Grant and Lee—remembered in history as among the greatest of earth's military heroes, and the memory of this place take rank with Marathon, Thermopylæ, and Waterloo. I am indeed thankful that we meet to-day as friends and not as hostile forces, that we meet to advance the cause of science and of humanity. You have done a great work for the upbuilding

of dentistry and for the betterment of humanity, but the world expects still more, and will watch with interest your deliberations. I am sure that you will not disappoint the largest expectations of those who wait on you as the true exponent of scientific dentistry. Again, gentlemen, Virginia extends her most cordial greeting. All that we have and all that we are is yours to-day.

RESPONSE OF PRESIDENT PATTERSON.

THE welcome from the Virginia State Dental Association brings to us the thought that without fraternal feelings in professional life much in our lives would be without interest and without brightness. No profession can to-day hope for success without cementing in bonds of fraternal and ethical friendship those who are desirous of placing that profession upon a higher plane. This is true of the dental profession as well as others. Therefore, this welcome from the Virginia Association, representing that great hospitable State, comes to us with a pleasant sound, especially as we feel that they mean all that they say to us. In receiving this welcome, and in responding to it, we feel that we are doing something to place dentistry upon a firmer foundation, that we are cementing the whole profession together, and bringing it up to a higher plane. We feel that we are taking a step forward in the right direction.

We thank you very kindly for your generous invitation. We trust, gentlemen, that you will be present at all of our sessions, and take part with us, and that we may thus add something to the achievements of our profession.

ANNUAL ADDRESS.

By J. D. PATTERSON, President.

Fellow-Members of the American Dental Association:

Again we are permitted to meet in convention assembled after an interregnum of two years, instead of the usual time; for the brief session at Chicago in 1893 can scarcely be accredited an Association meeting, as only a few minutes were occupied in transacting a little business which would keep in proper sequence the life of this Association.

As we come together in this year of our Lord 1894, after so long an intermission, I feel that I voice the feelings of all members when I say that we come with increased loyalty to this grand national organization; loyalty to its aims and purposes; loyalty to its history. Certainly in the annals of the dental profession the American Dental Association will always hold a notable place. So long as time shall last, its membership will value the knowledge of dental science gained at its annual meetings, will cherish the friendships and social pleasures which have clustered around them, and the whole profession, the world over, will accord to this Association a high place among the potent factors of advancement. Our local and state associations we remember with pride; the frequent gathering of men in our calling has helped to weave the fiber of true professional manhood; but we especially turn to this Association with an enthusiasm which time but increases. Whatever of good or ill has brought sunshine or cloud in the fleeting year just passed, we come to these meetings picturing to ourselves the greetings of old friends and felicitating ourselves upon meeting new ones. "As the Jews go up to Jerusalem," so we travel to the meeting-place of this Association, to renew our fealty to all demands upon us. Our labors ended, we return with minds refreshed; we have gained some sunshine and some new skill, which bring beauties to the mind, a better apprecia-

tion of life's value and its duties, and an increased ability to minister to human suffering.

With the roll-call that has been made at this meeting, what memories crowd upon us of those who have answered to the last roll-call, "whose labor is ended." Death has been with this membership. Of those who have gone within the last two years, some there were who had grown gray in the struggle, some whose work seemed scarce begun. Of them what shall we say? We extol while we lament. Their memory and their usefulness point us to means whereby we can more acceptably fill the trust they have left us. Lessons come to us daily and hourly in all the walks of life, but the lessons taught by the fact that some co-worker has gone to the dimly outlined land of the future bear with them a strange and importunate burden; lessons that call us to look more deeply and earnestly to our advantages and our duties. They call to all that time is passing; that naught but good thoughts and deeds live, or deserve to live, after we have gone to "that bourne from which no traveler returns." Long live the lessons they teach, and let no hand be raised "their frailties to disclose." "No future presence, however dear, can fill the places made vacant." When your Committee on Necrology make their report, suitable notice and eulogy will be given to deceased members. Their names are as follows: W. H. Eames, St. Louis; W. W. Allport, Chicago; Fred. A. Levy, Orange, N. J.; Geo. W. McElhaney, Georgia; R. B. Winder, Baltimore, Md.; Geo. Watt, Xenia, Ohio; J. H. Smith, New Haven, Conn.; A. O. Rawls, W. C. Wardlaw, G. A. Wells.

The thought of your presiding officer, in anticipation of this meeting just inaugurated, has been crowded with plans whereby this Association might be turned to an increased usefulness, a more decided, pregnant, and authoritative force as a recognized leader and arbiter in the destinies of our profession. Whatever we may say of criticisms that have been made upon this Association, and while we remember that criticism is often invidious, yet we think it can be truthfully said that we as a body have not enough of that enthusiasm which creates a force for progress, which should be expected in the national organization of a profession having aims so high and duties so necessary for the welfare of the human race. We have allowed the negative spirit to prevail, and dust to gather upon the picture until a placid indifference is upon our body politic. In our meetings we have allowed too much undigested science and trivial repetition to

burden the record, in lieu of original matter which has been the result of labor and investigation.

It is no new disease in an association of this kind, and I offer no new remedy; I only desire to call your attention to what history and experience have taught to be the life of such an organization as this.

"The life of an individual is a miniature of the life of a nation." Professor Draper, who gives utterance to these words, strikes the keynote of success, whether we speak of nations, states, or dental associations. Individual professional life is always indicative of what the professional whole will be. If the individual occupies a position which is not the outcome of persistent and systematic effort for superiority, then it will indubitably be reflected in the life of any organization of which he is a member, and to its disadvantage. The first step, then, in our advancement must always be born of individual worth. There is not one among us who cannot testify that this is true. He has seen success in different fields, and, tracing back, he has discovered that it has come through individual worth, loyalty, and enthusiasm. In our own profession the careful student, the faithful worker, the enthusiast, has made the whole profession indebted to individual worth and force. Our Association meetings are led and electrified by a few, and out of their work has come our advancement.

How shall the number be increased? I deem it evident that it can only be done by strenuous self-culture. This is the bone and sinew of the whole body. If we expect success we must first put ourselves in a condition to merit it. This can only be done by sacrifice. "The worth and truth that comes without much seeking, without self-denial, without mind labor or hand labor, is intangible; it will fail you." Ever since the morning stars first sang together this has been true. You and I, in our honest hours, have known it, but we have delayed the hour of improvement. We must say with the poet, "I own I have not cultivated my garden. The weeds have sprung up everywhere; once or twice I have thought I would begin to clear away the weeds, but now I have not the courage." This indifference in the dental profession has stopped improvement, has clogged the wheels that might turn with power almost irresistible.

The too-prevalent idea among young men is that individual power is given only to a few, when *it is given to every one who works for it.* "The temple of knowledge (which is power) is in our very midst. Any one may enter it who chooses." "The philosopher may enter,

the stonebreaker may enter. It is in the very midst of every-day life, in the plains lying open to all." "If we fail, we can remember that we have started, and not many do that." A wonderful writer thus beautifully expresses the striving for individual worth and perfection: "When I lie down worn out, other men will stand young and fresh. By the steps that I have cut they will climb; by the stairs that I have built they will mount. They may never know the name of the man who made them. At the clumsy work they will laugh, but they will mount, and on my work; they will climb, and by my stair; they will find truth, and through me."

If any one doubts that a strictly dental field brings to him sufficient scope for high mental activity, he must remember that a liberal profession embraces all the realms of science and art, that he may seek knowledge in anything correlative to his profession. There is no department of science where investigation will not improve the dentist as a dentist and as a man. The mind cannot conceive of any training which will not bring a little of brightness and perfection to gild the whole, whether it is culture in the arts and sciences, or within the—sometimes so-called—limited scope of dentistry. There can be no error here unless it be the error of half-learning, of superficial science. This is always nugatory, and brings but ephemeral reward.

Self-culture and self-reliance gained are not, however, the whole battle gained. Our knowledge must be well directed in associated effort. Our Association must have discipline. "Progress is the result of natural causes," and the first feature in this progress is, as we have tried to show, in individual merit; but, at the same time, these causes out of which progress comes to our Association must be *instituted.* They will not institute themselves. The army must be set in motion. Each man must have his appointed work, which looks to some concrete end.

The plan in our Association—dividing work into Sections—is historic and in many ways admirable; yet it does seem that we fail because so few of the members of the Sections assist in the work assigned. So long as the work is purely voluntary each waits for the other, and the result is that we hear from the enthusiastic men each year, and new talent lies undiscovered. In our Association as it is now ordained, the only performance that is imperative, that is a law, or seems to be, is that your President shall deliver an annual address. I think it would be well if every member were compelled to be in the place of the President,—say much or little,—to be assigned by the

officers of Sections to certain work, his membership obligating him to report at each annual meeting. Thus would strength be developed that would give new sinew to our American Dental Association. "Progress does not go on like the erratic phantasm of a dream," without reason or order; but it comes, if it comes at all, as the result of antecedent causes. First, in self-culture; then in organized, associated effort. It is *not* the result of destiny, is not erratic, nor is it providential.

In the proposed revision of the Constitution and By-Laws governing this body, by a Committee appointed in 1891, we find some most excellent ideas along this line in their report, features which should at once be adopted and which would surely work to the betterment of our associated work. The report provides for one amendment substituting Article VI of the Constitution, providing for a "Supervisory Committee of Work," with clearly defined duties looking to more perfect scientific results, and seems a most admirable innovation. If adopted, it will be the inauguration of a more strict police power, which we must acknowledge is necessary, whether in association work, in college education, in legislative enactments, or in any other factor for the advance of our profession. The attention and interest of every member is invited to the full report of this Committee when it shall be brought to your notice. Other recommendations are chiefly designed to subserve the time of the Association for scientific work, leaving business routine out of the regular sessions. The justice of this should appeal to all, and the amendments suggested are all in the line of *instituted* means for progress, to which I have poorly but earnestly directed your attention.

A review of those forces in dental education which are usually deemed the chief ones, viz—dental colleges, dental literature, and dental legislation—during the past two years, we believe, shows to the world a commendable activity and improvement. This Association has ever looked with fostering care and interest upon the various advances made by dental colleges, the Faculties Association, dental journals, dental laws, and the action of the Boards of Examiners having in charge the administration of dental enactments. Differences have existed between these various forces, and the members of this Association have offered advice which at times has not fallen upon good ground; yet, nevertheless, there has been, we believe, that harmony which has brought about a steady improvement.

Your presiding officer in 1892 asked you to take some action in

regard to advising dental boards of examiners and those interested in dental legislation to formulate some plan whereby requirements for registration in the different States should be uniform, and permitting a certificate of registration (under the proper qualifications) in one State to be honored in adjoining States without question. The Committee upon President Walker's address having these recommendations under consideration, reported that there would of necessity have to be a "leveling downward" instead of a "leveling upward," if uniformity in these requirements were carried out. This Committee did not, however, satisfactorily prove their statement.

There can be but one right in any matter of legislation and law, and in its administration equal justice to every dentist, high or low, is demanded.

To say that unification upon this matter is inadvisable, is to say that the civil rights of every citizen cannot be secured under civil law. Civil and uniform rights in the matter of registration for the practice of our profession, as it now stands in neighboring States, is a travesty upon justice and equity.

In the proper adjustment of this matter, no man and no State is asked to "level downward," for there is no plane to rest upon save that which is lawful and right for every man; therefore your attention is again called to this subject in order that you may offer some fitting recommendation for the solution of the difficulty.

In a review of the activity in the dental profession since our last assembling, the World's Columbian Dental Congress must occupy the most prominent place. In the individual history of each one in the profession to-day, no other event like this great meeting is likely to be witnessed. Its crudity in some features was the natural result of the first attempt of a dental congress upon such a cosmopolitan scale, but in view of the great aggregate results benefiting science and the social ties of the profession all the world over, we can well afford to withhold criticism, and give our praise to those who, without reward, and for very love of their profession, labored faithfully, and whose labor of love has been so well requited. The echoes of this great meeting come to us again and again, and for years will not cease to sound in our ears lessons in knowledge, in fraternity, and praise for those men upon whose shoulders pressed the burden of responsibility.

In closing, I will say that whatever of success comes to this Association in the future by instituted and determined effort, while the scientific should ever be foremost, we must never forget the ethical.

We must confess, that while we believe the world is growing better, we cannot fail to note the increase of the number in our profession, or upon its outskirts, whose unethical methods of conducting their professional life make one sick at heart. It is hoped that this increase is not so great in the East as it is in the West. The men who have received an education in college, whose fitting for practice has been of the best, are betraying promises made, and becoming a drag upon professional purity, reputation, and advancement. They are the *anarchists* in our calling, and should be treated as such. No line too strict can be drawn in this Association upon this subject, and this discipline we believe is one of the features in dental progress which must be instituted. Well-meaning men have written and spoken in favor of abolishing all codes of ethics, as beneath a liberal profession, but so long as the socialistic tendencies are so prevalent, it would be madness to do away with the rules for their suppression; rather make these rules stronger, so that in the *esprit du corps* within our Association will be found a hatred for those who infringe upon the strictest letter and spirit of our code of ethics.

Trusting that what has been said in this address that may appear irrelevant will be attributed to mistaken enthusiasm, and believing that if the suggestions I have tried to give are followed, our Association has a future greater than has been achieved in any organization in our profession, I conclude by asking your forbearance and assistance while I am your presiding officer.

REPORT OF SPECIAL COMMITTEE ON THE PRESIDENT'S ADDRESS.

FORTRESS MONROE, VA., Aug. 8, 1894.

TO THE AMERICAN DENTAL ASSOCIATION:

Your Committee to which was referred the President's Address would respectfully report that upon a careful study it finds several suggestions worthy of serious consideration by this body.

First. In order that the interest which formerly existed in the profession generally in the meetings of this Association may be revived, it would recommend that clinics, in both the surgical and prosthetic departments, be re-established.

Second. The suggestion as to the unification of the examinations in the several States, and the registration of certificates of those moving from one State to another without further examination, your Committee considers an excellent one, but impracticable so long as the different State Boards of Examiners are selected in the various ways in which they are at present. There is, in the estimation of your Committee, altogether too much politics in these as well as in other professional appointments.

Third. It is further suggested that the chairmen of the different Sections be instructed to urge that every member in his Section shall at each annual meeting of the Association have something, even though it be brief, in writing, to present, so that all, instead of a few, as is and has been complained of, may take an active part in the work of the Association.

Fourth. From what your Committee can learn of the workings of societies which have adopted the plan of having business transacted by an Executive Council, it is of the opinion that such a change in the management of the business of this Association would work an injury to it, from the fact that the charge would be made that a few men managed the business without the consent of or consultation with the Association as a body.

FRANK ABBOTT,
TRUMAN W. BROPHY,
WM. CRENSHAW,
Committee.

SCHEDULE OF QUESTIONS

SUGGESTED FOR THE

Consideration of State and Local Dental Societies.

No. 1. Can alveolo-dental abscess arise after complete sterilization and obliteration of the canal by an impervious filling, and if so from what causes?

No. 2. What are the best means of diagnosis of pulp-calcification in its several forms? To what extent does the process demand treatment, and how shall it be treated, (*a*) with respect to its prevention, and (*b*) remedially?

No. 3. What is the most satisfactory antiseptic and best method for root-canal sterilization?

No. 4. Is not operative dentistry liable to the same injury from the too prevalent use of plastic stoppings as occurred to prosthetic practice from the introduction of vulcanite?

SECTION 1.

PROSTHETIC DENTISTRY, CHEMISTRY, AND METALLURGY.

REPORT BY R. M. SANGER, CHAIRMAN.

MR. PRESIDENT AND GENTLEMEN OF THE AMERICAN DENTAL ASSOCIATION:

At the meeting of Section I in 1891 there were two members present, and at a reorganization the same year one more was induced to attend. At that meeting a definite method of work was adopted, embodying the sending of personal letters to all the members of the Association, inviting them to participate in the work of the Section; also establishing a headquarters for the Section at the meeting in 1892. The results warranted the continuance of this method for 1893–94. As a result, the Section spent the entire afternoon in considering the material presented to them, and, as they were unable to complete their work, they can only make a partial report by offering the following material for your consideration:

1. The demonstration, by Dr. Geo. Evans, of New York, of a matter pertaining to crown- and bridge-work.

2. The exhibition and explanation of a porcelain furnace, by W. M. Sharp, of Binghamton, N. Y.

3. The presentation of the Daly method of gold lining for rubber plates, by Dr. Noble.

4. The description of a method of vulcanizing rubber between metal, by Dr. St. George Elliott.

5. A description of a method of swaging plates with shot, by Dr. L. E. Custer.

6. The description of a hydraulic press for swaging, by Dr. E. A. Bogue, of New York.

7. A device for bending piano-wire for regulating purposes.

8. Dr. Crouse will describe an automatic pump.

9. Dr. Jackson will present an illustrated paper on Orthodontia.

We regret exceedingly that we were unable to procure a blackboard to aid the gentlemen in presenting these subjects.

SECTION I.—Continued.

The Sharp Dental Furnace.

DESCRIPTION AND DEMONSTRATION BY W. M. SHARP.

GENTLEMEN, the little furnace which I have here is for general laboratory purposes. It is more particularly adapted to porcelain and aluminum work. It is largely made of clay, with a little iron work about it. The fuel used is gas. The tube which is attached to the bottom is used as the mixing chamber, at the lower end of which are two smaller tubes, one carrying gas, the other air, from the blower. The upper end of the larger tube, or mixing chamber, is covered with iron gauze, above which the gas burns. In the interior of the furnace there are four uprights of clay, upon which rests a small disk of clay which serves the purpose of receiving the blast, thus protecting the bottom of the muffle, and of spreading the flame, causing the muffle to heat evenly. The disk also serves as a base on which to support the aluminum flask, in that work, or on which may be placed cases to be soldered, crucibles, etc. This disk sits in notches below the level of the uprights, so that when the muffle rests on them there is a space between disk and muffle for the circulation of heat. The muffles are provided with a small nipple at the closed end to prevent them going too far in and thus shutting off the heat, which now is permitted to pass well around the end of the muffle. The sheet-iron jacket which accompanies the furnace is lined with asbestos, and has an iron track on the inside on which a clay muffle rests when used in connection with porcelain work. This track, being open in the center, permits the jacket to be placed over the aluminum flask in that work, and is no objection. When this jacket is used to cover crucibles in melting metals, or when cases are to be heated for soldering, the door in the side is convenient through which

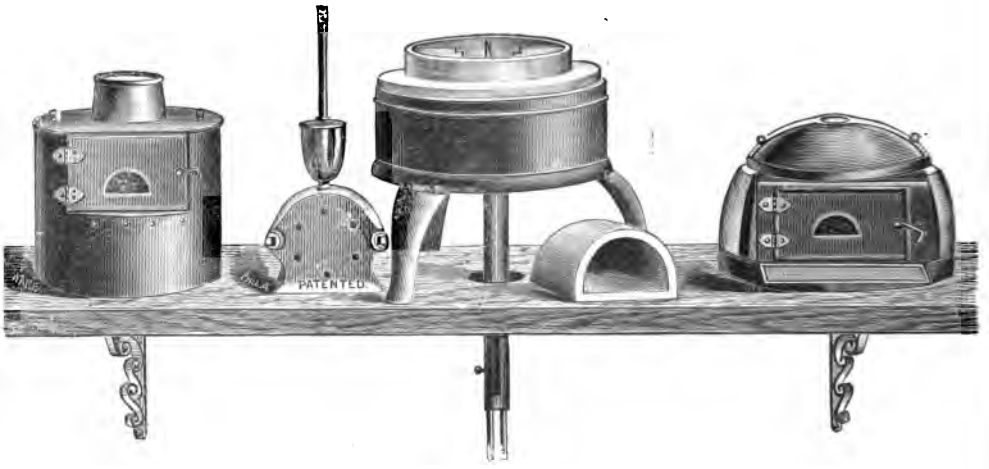
the case may be watched; it is provided with ears, by which it is raised when hot, using a fork for the purpose.

I have here an aluminum flask. In the cup the metal is placed, and the whole set on the clay disk and covered with the jacket. It is now in convenient form to cast the metal.

In this furnace you do not heat your investment in the flask, hot enough to change its shape. It does not contract, because there is very little heat in the investment. A large part of the flame is around the cup, which sits in the flue, and as soon as the metal is in a molten condition, which can easily be seen through the flue, this is removed. You apply the little stopper to the foot-blower, and force

it in with the pressure of the air. By this process the temperature of the investment is about 500 degrees, while in many furnaces the temperature is 1300 degrees. Therefore, I claim that this is the best form of aluminum apparatus.

This dome is of fire-clay held together with iron castings. It is pitted on the inside, making numerous pockets, which prevents the heat from escaping so rapidly, and causes the dome to become heated much quicker than it otherwise would. The numerous openings are for the escape of heat, and are distributed so as not to allow too great a loss of heat at one place, but to offer resistance and cause a



greater distribution, thus making it a rapid heater. The large opening is to receive a muffle. This dome in position on the bottom half of the furnace, with a muffle in position, is in convenient form to bake any piece of porcelain work from an inlay filling or crown to a large case of bridge-work or a full set of continuous-gum teeth.

The sheet-iron jacket used to make the aluminum part of this furnace may be placed upon this dome on the casting made to receive it, and a second muffle placed in it upon the iron track. This now makes a most convenient form of furnace, having two muffles, one in which to do the baking, the other for carefully drying out the case and preparing it, and in which the case may again be placed when baked, to allow it to cool more quickly. When the lower muffle is white hot, or of the temperature to bake, the muffle in the jacket,

or preparatory muffle, is just red enough to make it perfectly safe to draw the teeth from this and pass well into the white-hot one. The shelf of iron just below the muffle opening on the dome is to guard against possible accident in transferring from one muffle to the other. The door is made in such a way as to receive clay-door fronts of good thickness, and which are easily and quickly replaced when necessary.

Although these clay-door fronts are made to fit very nicely, yet I should recommend luting around the end of the muffle with fire clay, asbestos, putty, whiting and plaster, or common brick clay. This is done in nearly all furnaces where muffles are movable. It prevents the escape of heat, and takes but a moment to do. When the furnace is in position to bake, the teeth should be in the upper muffle, and to light the furnace it is only necessary to unscrew the thumb-screw at the base of the furnace, which allows the mixing chamber to fall and expose the wire gauze, when the gas may be lighted and pushed up, carrying the flame into the interior. At the lower end of the mixing chamber is a sliding valve, which allows the air to mix with the gas in the right proportion when used without the blower, for heating up cases slowly, and makes in effect a Bunsen burner.

DISCUSSION.

DR. BOICE: What kind of a bellows do you use?

DR. SHARP: I use a No. 9 B bellows for this. In answer to Dr. Crouse as to whether the blower he has in his office might be applied to this, of course I don't know how much force of air he has; but if you take a No. 9 Buffalo bellows, it is not necessary, in blowing, to inflate the rubber until the netting becomes tight; you can leave the netting a little loose and have plenty of air. So the running of it is not laborious. You can run it easily with a blower of that size.

As to the time required to fuse porcelain with this apparatus, it varies. There are some kinds which fuse at a low temperature, and some at a high temperature. I have fused some kinds to a glassy surface in five minutes, starting with a cold furnace. There is a low-fusing enamel material that is now to be had in many of the depots, and which is very good in crown-work. Then taking the kinds which fuse at a higher temperature, I can fuse Close's in fifteen minutes, starting with a cold furnace and going slowly.

Should the muffles become cracked, it will make no difference with the work; they may be used just as long as they can be held together.

The best specimens I ever made were baked in a broken muffle. This furnace is so constructed that there is perfect combustion; so long as you have that, it does not make any difference what fuel you use. I had intended to use the gas here, but the pressure in this hotel is not sufficient. I had endeavored to obtain a cylinder of compressed gas from New York, but I received an answer that I could get it more quickly in Baltimore. I have telegraphed to Baltimore, but haven't received the cylinder yet. It was my intention to offer to fuse any tooth presented to me, because I have fused what is claimed to be the highest fusing body of enamel made. I will undertake to fuse any tooth-substance that may be presented when the gas comes.

DR. WEEKS: I should like to inquire if the compressed-air systems which we find in some modern buildings, with a pressure of thirty or forty pounds, would be sufficient to operate the blower?

DR. SHARP: I have no doubt that would be sufficient. I don't know how much pressure I get with a No. 9 blower by just pumping moderately. I don't think it is very much.

DR. TAFT: I should like to inquire whether any other fuel beside illuminating gas is practicable,—such as gasoline or coal oil?

DR. SHARP: I cannot speak positively on that point to-night. This furnace is comparatively new, and I have not completed my experiments with different kinds of fuels. I have no doubt it will be applicable to different kinds of fuel shortly. It is now ready for use with gas as a fuel.

DR. SILL: How long would it take to fuse S. S. White body?

DR. SHARP: Do you mean the body which they sell in their depot, made after Dr. Allen's formula, and known as the Close body?

DR. SILL: That is about the same.

DR. SHARP: I can biscuit it in fifteen minutes. This clay is made of sufficient thickness so that it will hold the heat for hours. You can cool the case down and put your enamel on, return it, and get it hot without hurrying it at all, and then you can easily fuse the enamel on it in fifteen minutes. It is no trouble at all. I have done it many times. I have volatilized the coloring-material in that—of course at a higher temperature—in about twenty-two minutes.

I have taken advantage of everything to save the heat in the little cups on the inside, and also in the burner. I have saved six minutes in heating this furnace by making the top in this shape, with those holes. With just one opening, the gas escaped too rapidly; but by making small ones, I utilize the combustion to better advantage and

save six minutes in heating that one material. I shall never attempt to further reduce the time in fusing in the furnace, because I don't think a further reduction in the time is possible, taking into consideration the size of it. It has in all respects the qualities of a coke furnace. It is thick enough to give you all the volume of heat necessary to do nice work. In a furnace where the muffles are thin and the whole body is very light, it isn't possible to get good results in continuous-gum work, because the heat rises and falls too quickly, and cannot be held. You get the best results when you take it from the preparatory muffle and put it right in the muffle when it is ready to fuse, and keep it there a few minutes. You can open it and examine it if you like. But that is when you get best results in continuous-gum work.

I have here a little specimen of work done in this furnace, which I will pass around. It is small, but it will be seen that it is a high-fusing body and enamel. I baked the enamel on the teeth as well as on the gum. You will see that it is really a little over-fused, showing that I carried the temperature even higher than was necessary.

THE PRESIDENT: Has Dr. D. D. Smith any information to give us with reference to this furnace?

DR. D. D. SMITH: I have but a single word to say. I have never yet seen a gas furnace that was satisfactory in continuous-gum work, but this furnace may be an exception. I am sure I hope, in the interest of those who have continuous-gum work to do, that it is. Certainly the introduction of a thoroughly reliable gas furnace would be very desirable. This seems very simple, and, from the description of it given by this gentleman, it seems highly probable that it will do its work. If it will, I for one shall be very glad to welcome it. I can give you no information about this furnace, as all I know about it is what has been stated here to-night.

SECTION I.—Continued.

Hollow Gold Molar and Bicuspid Dummies, and Ferrule Crowns without Exposure of Gold.

DESCRIPTION BY GEORGE EVANS, OF THE SECTION.

PRACTICAL experience in bridge-work evidences the advantages of all-gold bicuspid and molar dummies in cases which properly admit of their use; but where they are long or large, the weight and expense, owing to the amount of gold required to fill them, are at times objections to their use. To overcome these objections and lessen the labor of construction, I have lately devised a method of making all-gold dummies hollow, as follows: Take a contour gold crown of suitable size, with a thick grinding-surface, or one which has been thickened with solder and the flux removed, and cut away the gold

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FIG. 1.

FIG. 2.

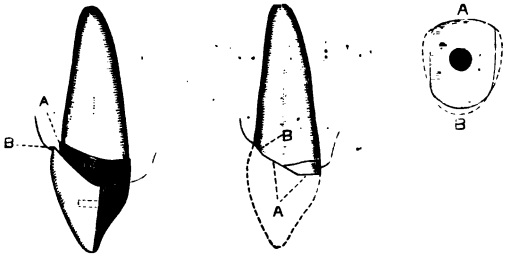
forming the palatal section of the collar to the form termed self-cleansing, or shape the neck of the crown to the exact contour of the portion of the gum the dummy is to rest on, and scrape a little from the surface of the model to cause pressure and insure closeness of fit. Melt a small quantity of solder with flux to a ball form. Fit a piece of platinum plate, about No. 32 gauge, over the aperture; place the ball of solder on the platinum within the gold cap (see Fig. 1). Hold cap and platinum in a Bunsen flame, and heat slowly until the solder melts and appears under the edge of the cap, then instantly remove from the flame, trim the platinum, and stone the edges. This

gives you a hermetically inclosed dummy-tooth of gold, from the interior of which the air has been exhausted by the heat. The dummy can then be placed in its position on the bridge and soldered in the usual manner. Fig. 2 gives the palatal aspect of a bridge the dummies of which were constructed in the manner described. The bicuspid dummy is given a self-cleansing form, and the molar is shaped to rest on the gum.

The advantage of a collar or ferrule on crowns for the front teeth, as affording additional security of attachment and insuring against all possibility of longitudinal fracture of the root, is generally accepted.

The objectionable features of collar crowns are the exposure of the collar at the cervico-labial section, which is difficult to avoid, and the irritation its presence there is apt to cause the peridental membranes, which it is more liable to do at this point than at the other sides of the root. The collar, to be invisible, has to be fitted well under the

FIG. 3. FIG. 4. FIG. 5.



gum-margin. This requires extensive removal of the periphery of the cervico-labial section of the end of the root, rendering adaptation of the collar at this point an operation few practitioners succeed in accomplishing perfectly. An examination of collar crowns in the mouths of patients frequently results in showing a condition, as regards construction and adaptation, such as is shown in Fig. 3, at either of the points A or B, or both. At A, the edge of the collar, owing to the inward slant of the root, protrudes slightly, and at B the porcelain is projected beyond the line of the collar for position or to hide the metal. Either or both in time produce and maintain an unclean condition, worse than a deep-seated line of cervical decay in a natural crown, causing irritation and gradual absorption of the adjacent investing membranes.

The form of crown about to be presented is not new in principle, neither is it offered as a universal substitute for the ordinary collar

crown, but as embodying features which are advantageous, and without some of those found objectionable in the ordinarily used collar crowns. The method will greatly simplify and facilitate the operation, and it is one which can be accomplished by those of only ordinary skill.

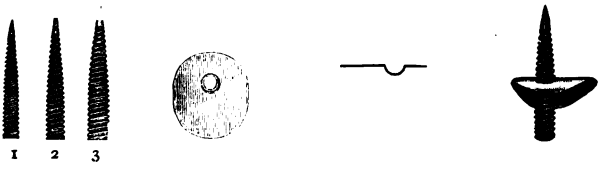
Take, for example, the right superior incisor illustrated in Fig. 4. A shows the line of trimmed root; B, point at cervico-labial section which may be removed if it is desirable to have only the porcelain front cover that part. In Fig. 5 an enlarged outline of the surface of the prepared end of the root is presented, A being the labial and B the palatal side. The dotted line is intended to indicate the original form. The shaping is done in the usual manner with disks and trimmers. It will be seen that the line of the labial portion is left intact.

The root-canal is next enlarged with an Ottolengui root-canal reamer (see Fig. 6).

FIG. 6.

The size and condition of the root and the judgment of the operator should determine the number or size of reamer to be used and the depth to which the canal should be reamed. To the reamed canal is fitted a prepared iridio-platinum post, as illustrated in Fig. 7, cor-

FIG. 7. FIG. 8. FIG. 9. FIG. 10.

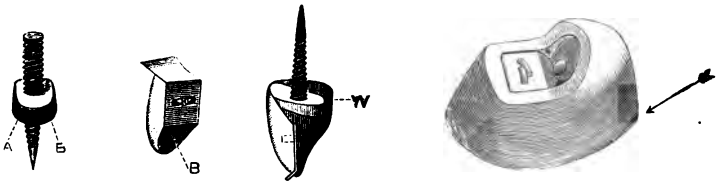


responding in size by number to the reamer used. These posts have a screw-thread cut on the sides, tapering downward to the point, so that they can be screwed just where wanted and soldered in an instant. Next take a prepared disk of platinum plate, having a perforated concave depression as seen in Fig. 8. This depression fits in the orifice of the root-canal. If necessary, the orifice may be slightly enlarged with a round-headed bur. This disk of platinum plate, which is about No. 35 gauge, is made by stamping with a punch or die such as were exhibited. In the depression in the disk, as shown in section in Fig. 9, pure gold with a little flux is melted, and in the center of this gold a hole is punched through the disk. The post when fitted to the canal is grasped at the line of the orifice of the canal with small pliers, the post removed, and without moving the position of the pliers it is screwed into the disk up to the points of the pliers, thus

giving the post its position in the disk. The sides of the disk are bent on account of the approximal teeth, as shown in Fig. 10, and the relative positions of the post and disk on the root are determined.

The disk should fit in the orifice of the canal when the post is in position. By twisting the post in the disk, change of position is instantly effected. Both post and disk are next removed, and the post secured in position in the disk by being held in a Bunsen flame, and heated to a point that fuses the pure gold in the depression. No flux is necessary, as sufficient remains from the first fusing of the gold. The post with the disk is next inserted in the root, the platinum pressed with a large flat plugger, and malleted so that the line of the edge of the end of the root will be impressed upon it. The platinum is next removed, and slit at the two points between the palatal and approximal sides shown at A and B, Fig. 11, and guided by the mark

FIG. 11. FIG. 12. FIG. 13. FIG. 14.



of the end of the root on the platinum the approximal portions are bent over with small-pointed pliers to embrace the sides of the root. The post and cap are then placed on the root, and the side flaps, with the aid of foot-shaped condensers and burnishers, are closely fitted. The palatal flap is next brought down to position. Frequent removals and annealings are necessary during the process, which should include finally trimming the edge of the platinum, smoothing with a corundum point, and then an annealing and an all-around burnishing of the cap to the root.

At the cervico-labial section the porcelain can rest on the platinum, or the platinum can be trimmed so that the front edge of the porcelain may be fitted against the root, covering it (see Fig. 11). The projecting end of the post should also be removed, leaving it a little flush at the palatal side. The porcelain front, which should be a cross-pin plate tooth, is ground and closely fitted to the surface of the root or metal, as may be, at the cervico-labial section under the edge of the gum, but a properly shaped space opening toward the palatal side is left between it and the surface of the cap. To so shape the porcelain

simplifies the fitting of the cervical section. The space between the cap and the porcelain is also easier filled in the soldering. To the porcelain front at the part B (Fig. 12) a piece of very thin platinum foil is shaped, the porcelain heated, the part veneered with a mere film of gum-shellac, and by pressure with a napkin or cotton the platinum foil is attached thereto. The rest of the porcelain is then backed with thin platinum plate (about No. 32 gauge). The platinum is left slightly extending over the incisor edge, and the porcelain front is waxed in position on the cap.

Fig. 13 shows the crown waxed up ready for investment. Wax in full amount must be extended over the collar to its edge, in the seams, and between the porcelain and the cap at every point solder is to flow. (I generally use Parr's fluxed wax.) Fig. 14 shows the invested crown with the wax removed. In trimming the investment, the material must not be removed from over the collar lower than the line of the surface of the cap, or in such a manner that the platinum turn-over edges are exposed to the direct force of the flame. If the collar is not exposed, the solder will flow over the outer surface of the platinum just where it is wanted and where wax has been applied, and all the parts will become united.

The investment must be slightly raised at one end, and heated up at its base with the full flame of a gas blow-pipe thrown in the direction indicated by the arrow in Fig. 14. Heat thus applied will cause the solder to flow downward and fill the interstices in all parts of the investment as though it were an ingot. The best way is to apply solder a little at a time until the deep parts are filled. The flame is then withdrawn for an instant, and with a small pointed flame and more solder the backing can be contoured. As platinum forms the cap and backing, the soldering can be conducted without fear of accidentally fusing those parts.

The form of crown described, as well as the ordinary collar crown, I usually cement in the following manner: Having the root and crown ready, I warm the crown and apply a thin coating of chloro-gutta-percha to the post. The chloroform, instantly evaporating, leaves a film of heated gutta-percha. Immediately the crown is adjusted to the root and removed. This shapes the gutta-percha on the post. The crown is then allowed to cool, and is cemented on as though no gutta-percha was used on post. A crown so cemented can be removed at any time by repeated applications of the thick part of a heated root-canal drier to the metallic portion of the crown,

which communicates the heat to the post. In a short time the sheath of gutta-percha around the post is softened, and the crown can usually be removed without difficulty. I also attach ordinary bridge-work in this way, having abandoned the use of methods classed as "detachable," which only allow the bridge to be removed by the dentist.

Porcelain can be used in the construction of the crown described instead of gold solder. In such a case, the porcelain front should be attached to the end of the post. This can be done by flattening the end of the post and riveting the pins, or by soldering them.

DISCUSSION.

DR. FREEMAN: I should like to ask this question: In soldering up a hollow ball there is necessarily an expansion and contraction of the air, and the solder being soft at the time, there is bound to be an exit and inlet of the air into that ball. That, it seems to me, must open the way for other secretions to get in. I make these crowns as the doctor has described them, but I was taught by old Dr. Wildman, years ago, always to make provision for this that I have spoken of, and therefore I put a little piece of asbestos somewhere about, and after having completed the soldering and getting everything in shape, then I heat it up until I have expelled all moisture from the cavity, and proceed at once to put in a little gold filling, or you may twist a piece of wire screw into the spot. Otherwise the secretions will find an entrance. I discovered that by the patient tasting the pickle some time after I had made a bridge, where I thought I had certainly succeeded in closing the dummy.

DR. EVANS: I cannot see how secretions or anything else can enter a hermetically sealed gold ball or a crown, any more than it can enter into an Edison electric light globe. If Edison can secure a hermetical sealing of his globes, I think we can do it with a crown. I know I do it. Perhaps the vacuum which I obtain is not quite as perfect as he obtains with his mercury, but I do it very nearly. I don't know that such a thing as an absolute vacuum has ever been produced. But the secretions cannot enter if you do the soldering in the manner I have described. This is not theoretical; it is something I have tested. I have recently inserted a case, almost identically like the one I have shown you, for George A. Wilson, Secretary of the Odontological Society of New York, and he complains of no such thing as has been mentioned, and I never saw it occur. It is a self-evident proposition on its face, and I think any gentleman who

looks at it will instantly see that these hollow crowns are practically sealed. The specimen which I have here didn't have much gold used in it, because it was made as a specimen piece.

DR. FREEMAN: Then I submit that I can test the matter by heating it, and, after having put it in some water, I can put that plate over a fire and demonstrate that there is a gas expelled during the process of heating it up again. Of course, when it is heated up, the water is driven from it; but when the metal is in a fluid state, the metal itself is free. Now, when it begins to cool, and the force of the air begins to press upon it, it has no trouble in passing through that melted solder. It goes in there, and it certainly will leave a vent through which the secretions will pass.

DR. SILL: I want to ask Dr. Evans the object of the spiral post. I understood Dr. Evans to say that he used gutta-percha for filling the blades and making a smooth post. I supposed the object of the spiral post was to hold it intact after it was put in. Now, the spiral form is lost entirely if it is filled with anything to hold it in place. He tells us that he warms the chloro-percha, and in that way he easily removes it. It has always been my trouble to make posts hold where they were entirely straight or spiral or cone-shaped in form. I see no advantage whatever in the screw if the blades are to be filled.

DR. EVANS: My trouble with posts hasn't been to make them hold, but I have had difficulty in getting them out. The screw is not put on the post for any such purpose as making it hold. It is for the purpose of putting it in. There is a point which I forgot in my description. When I put the post in there, I screw it into that cap to the desired length. It is there, and it stays there. I then withdraw it, and, before I go further, I hold it in the flame of a Bunsen burner. There has been a little pure gold used, and, as a matter of course, there is a little flux remaining. On being placed in the flame of a Bunsen burner and being heated up to a light-red heat, the pure gold melts and seizes that post instanter, and holds it in position. You then go on with the other process. The reason the screw is put on there is because you can put the post up in position and quickly screw it just to the length you want. In the old way the plate would not always hold in position. It was apt to move; but this fits instantly. The cap is put in position, and, by holding it in the flame, in one instant it is soldered.

DR. GARDINER: Mr. President, in listening to the description of

this process, it seems to me it is a retrogression and not a progression. That was taught to me by Dr. Wildman sixteen years ago. When you compare that with the Richmond crown, the crown with a band around it, I should say it was "not in it." As I understand the doctor, he puts his solder inside. Now I don't do this work myself, but I get it done by a mechanical dentist. I grind a root down on a central incisor, and I send the cap over to a mechanical dentist; and when he brings it back, it doesn't fit. I find a little solder inside. I tell him, "You ought not to put the solder inside. You ought to put it outside. When you solder inside, it will not go up onto the root." You may file a tooth all you please, and, if you have a small amount of gold on the anterior surface of the root, the solder takes the place of the line of gold. If you fit a band to a root and grind it down even with the gum, and send it to the mechanical dentist to solder, if he solders it on the outside it will go into place; but if he puts solder on the inside, it will not go into place. So it seems to me, if I understand the doctor correctly, a thing like that which he describes is in the direction of retrogression instead of progression. I heard Dr. Crouse describing something of that kind in Chicago fifteen years ago, and it was nothing but a pivot tooth and a platinum band.

DR. CROUSE: I can readily understand how one in the audience, at such a distance from the speaker, would not get a correct appreciation of the process described by Dr. Evans, and the steps taken, and what the crown was when he got through. I have never seen anything that suited me so well for a crown as the one under discussion, the crown as I saw it in the Section this afternoon. It isn't simply a bit of metal burnished over the root, but it encases the root everywhere, except right on the very front, where you don't want any metal to show. It is the neatest way of making a crown that I have ever seen described. Another way is to put the tooth into a porcelain furnace and bake it onto a band. That is a very nice way. In that way you get rid of a lot of metal, and your tooth will look clearer and more natural, without that backing on there. But his method of encircling the cap gives a cap of platinum over the end of the root, except at the point where the front edge of the tooth rests on the gum. The old method that Dr. Gardiner speaks of, which was simply to make a little cap to cover the end, set with a little gutta-percha, made the meanest kind of a crown you could conceive of, because in a little while there was nothing under the end. But here

is a crown that can be set with phosphate of zinc, be perfectly clean, and be very satisfactory. The Richmond crown or banded crown, as we call it, is not a handsome thing, even when you do the best you can.

DR. GARDINER: In this process the platinum is on the palatal surface?

DR. CROUSE: On the palatal surface and on the sides.

DR. GARDINER: What is the difference between that and the old tooth you made years ago?

DR. CROUSE: Three of the sides of the root are protected by the band.

DR. BROPHY: Mr. President, all this I think will lead us back to the days when we had clinics in this Association. I am firm in the belief that a matter of this kind cannot be well understood in an audience as large as this without demonstration. For that reason I hope the time will come when clinics will be re-established, when the methods advanced, like that which has been so graphically described by Dr. Evans, will be presented in clinic. I have no doubt that every member here would be glad to see a demonstration of the methods explained by Dr. Evans. If we can have demonstrations of such methods, they will be understood; but I don't believe that twenty per cent. of those present understand distinctly and clearly all that has been described by Dr. Evans here this evening.

SECTION I.—Continued.

Dr. Daly's Method of Lining Rubber Plates.

DESCRIBED BY H. B. NOBLE, OF THE SECTION.

I PRESENT to you here what I believe to be the best gold lining for a vulcanized plate. The lining is made by depositing on gold foil, of about No. 20, until it reaches between 50 and 60.

This specimen, which I pass around, is bright on one side. On the other the deposit has been made from the thickness of 20 up to between 50 and 60.

The process is this: You proceed with your cast and put it in a flask, as you would ordinarily, up to the time the flask is opened and the wax entirely removed. Cleanliness is one of the absolute essentials in this operation. When the wax is all removed, the cast should be varnished with thin sandarac. After that is dry, it should have a coating of damar varnish. The latter is for the purpose of creating a sticky surface, so that the lining may be placed on it without danger of slipping or sliding.

The lining is now placed on the cast, the bright side toward the cast, in small pieces, not larger than half an inch, allowing one piece to overlap another sufficiently to be sure that every portion of the surface shall be covered with the gold. Having completely covered the cast with this lining, the rubber is packed as ordinarily, taking care not to make it thicker in one place than another, so it will not run or draw. It is then put in the vulcanizer, and when it comes out, you can burnish and brush it as much as you please; in fact, it should be very carefully burnished to remove any overlapping edges. I speak from experience when I say that this will wear. There is no

doubt about that. You have a pure gold-lined surface to your plate, as pure and clean and bright as a piece of gold plate.

I wish to say that in placing this gold lining upon your cast, and vulcanizing your plate upon that cast, you get also a more dense plate, because you have a hard metal surface to press upon. Now Dr. Daly, the inventor of this gold lining, will show it to you more in detail in the room of the Dental Protective Association. You can there see the process of putting it on.

SECTION I.—Continued.

Description of a Method of Vulcanizing Rubber between Metals.

By ST. GEORGE ELLIOTT, of Washington.

THE apparatus which I wish to describe is new as applied to dentistry, and has been introduced into England within the last few months by Mr. Humby. As far as I know, it has never been on sale in this country. The process is one of steam-swaging. It is not original with Mr. Humby. I remember reading of an analogous process introduced by a manufacturer in Glasgow, who made large basins in this way. He would take a sheet of copper or other metal, and fasten it between the die and the steam-chamber in such a way that it would be subjected to the elastic force of steam, and the copper blown into the form of the die. That is exactly the process used in the swager. I may describe it briefly by saying that the apparatus resembles a small vulcanizer, the upper part being a hemisphere. The lower part is a cylinder, in which the water is placed. Between the two is placed a disk of metal composition, the usual formula being two of lead and one of tin. It is desirable to use metal of two different thicknesses. The model is placed inverted in the upper part of the hemisphere, and fastened in position with plaster. A peculiar point in this connection is that at the highest point of the arch of the model it is necessary that a hole should be made communicating with the atmosphere. The metal disk being placed between the two parts of the swager, they are then screwed down together. The heat is then generated by a Bunsen burner, a cupful of water having been placed in the lower half of the swager, and in a few minutes a pressure of say one hundred and twenty pounds to the square inch is obtained. Accompanying the apparatus, as it is sold in England, is a steam-gauge, but this is not ab-

solutely essential. The metal which is between the two parts is blown up by the action of the steam underneath, so as gradually to adapt itself to the model above, and as soon as it has reached the highest point the steam is blown out through the orifice in the plaster.

I would suggest that the process be carried a step further, inasmuch as gold could be swaged in the same manner, having the outer section of copper with a gold center, gold being too valuable to use for the entire disk.

This process is necessarily confined to comparatively thin metal. It is not experimental, being used largely in England by mechanical dentists. One of its advantages is its extreme rapidity. The results attained are extremely gratifying, the vulcanite plate coming out of the vulcanizer of equal thickness and fine polish and surface hardness. The process is as follows: first a disk of metal is swaged to model. This is removed and a second made. These two metal plates are then used in flask, one on each side of the rubber. When vulcanized they require but little trimming and polishing.

SECTION I.—Continued.

Description of a Process of Fusing Platinum by Electricity.

By L. E. CUSTER, of the Section.

AS every one knows, when electricity goes through space, it forms what is called an arc, and produces the most intense heat. The practical application of this is what I am about to describe, which I have adapted to the incandescent current of 110 volts, constant potential.

The rheostat consists of eight slates, 7 inches by 10, about which are wound insulated copper wires, No. 16 or 18 gauge. These are so mounted as not to touch one another, and so as to be easily ventilated, for the purpose of keeping them cool.

This is placed in series with an instrument for fusing. The instrument consists of a carbon plate at one terminal and a carbon pencil at the other. The platinum is placed upon the carbon plate, and the circuit is made by touching the platinum with the carbon pencil. Upon withdrawing the pencil an arc is formed, which will readily melt any quantity up to an ounce. There is no limit to the quantity that may be gotten into one mass by a process of adding to.

SECTION I.—Continued.

Description of a Hydraulic Press for Swaging.

By E. A. BOGUE, of the Section.

SOME years ago, having seen in England a press designed to stamp gold plates to a proper swage, I inquired into it, and found that the impression was taken with Stent's composition and the model was made with Spence metal. The Spence metal, which is sulphur and, I am told, oxid of iron, was melted and poured into the Stent composition. This makes a swage exceedingly hard, but very brittle. Telschow, of Berlin, conceived the idea of swaging a gold plate by means of water pressure against the gold, which, in turn, rested against the Spence metal. It was found, after some two or three years' trial, that the press could not be made of sufficient accuracy and at the same time sufficient strength to answer practical purposes. He then adopted the plan of putting a sheet of heavy India-rubber beneath the gold plate, and driving the water or oil against the rubber. This swaged the gold plate very accurately, but had its drawbacks. Our French neighbors, having been in the habit of using hydraulic pressure in the manufacture of straw hats, began to make presses for dental use. The first one that I got is a press perhaps sixteen inches square, with as many capstans and wheels and screws as an ordinary steam engine, and exerting a pressure of something like three tons to the square centimeter, which is totally unnecessary. Two or three years ago I came across a press which occupied about as much room on the floor as a man's cap, and possibly two and a half feet high. This press costs about sixty dollars. It is capable of being worked by any laboratory workman, the swage being made of Babbitt metal in the usual way, with a counter-

die of tin. By pressing the gold plate as steadily and gradually as is possible with hydraulic pressure, we get, in a very few minutes, an adaptation which is entirely different from any plate which is struck with a hammer. It is scarcely worth while to go into ecstasies, perhaps, over the fit which can be obtained, but gentlemen who have seen it know very well that there is less rocking and a more perfect adaptation to the plaster model with plates struck up by these hydraulic presses, than it is possible to get by using either hammer or pile-driver.

DISCUSSION.

DR. BUTLER: I should like to ask the doctor whether he has made any examination of the plates made by this process, to see whether the gold hasn't been attenuated or thinned on the very surface where we need the greatest strength?

DR. BOGUE: I have calipered a good many plates and I have found them all more or less stretched at those points; but I don't find that the hydraulic press stretches them any more, but rather less, if possible, than the usual method. The calipering of the plate under those circumstances doesn't, in my hands, give sufficiently accurate results for me to answer that question completely.

DR. BUTLER: I apprehend, however, that if carefully examined or tested by calipering, you will find the reason why the plates are so closely fitted to the model is that the palatal surfaces of the plates are considerably thinned.

DR. BOGUE: I will say another thing which I forgot. It isn't at all necessary to put any more force upon the press than would be exerted with a hammer. One of my young men, not knowing what the press was capable of, put on sufficient force to burst asunder a malleable iron ring three-quarters of an inch thick, that fitted outside the swages. I had the ring repaired by shrinking wrought-iron rings around it on the outside. No accident of the kind has since occurred.

DR. ELLIOTT: Mr. President, in regard to the Spence metal, mentioned by Dr. Bogue, it is a peculiar so-called patented metal used in England, supposed to be made of sulphur and plumbago, but it has now largely gone out of use. Its advantages are very slight, if any, contraction upon cooling, and the fact that it will melt at a very low temperature, 120°. You can take an impression in Stent's composition, and cast directly into that impression. In that way you can take an accurate copy of the mouth in a very few minutes. It gives

a very hard surface, and like material of that kind it is exceedingly brittle. You cannot touch it with a hammer. It will, however, stand a very large amount of pressure if the pressure is applied gradually.

There is still another process which has been brought forward. The original experiments of Dr. Telschow, of Berlin, with the hydraulic press were with a press which cost over one hundred dollars, and he told me that it did not prove quite satisfactory, and was only resorted to in the final finishing of the plate. He usually swaged up the plate in the ordinary manner, and finished on the press. But there was a German by the name of Schmidt who got up a very simple press which I used for a good many years in England. It is valuable because of the rapidity with which it can be worked. You can make the models of Spence metal and put them in the small press, which is simply a screw-press, like the two parts of a flask. In the lower portion you put the model, and in the upper portion a reverse. You put the gold between the two and apply slight pressure, then remove it and clip your gold, and then with slight pressure and without extra effort you can bring the gold to position.

DR. BOGUE: If I remember rightly, Dr. Elliott saw Telschow's first experiments, and he very justly says they were not successful. He did not use my large press. The smaller hydraulic press accomplishes more than any other screw-press which I have ever seen.

SECTION I.—Continued.

Swaging with Shot.

DESCRIPTION BY L. L. BARBER, OF THE SECTION.

MR. PRESIDENT, I should like to describe a method of swaging a plate that I saw Dr. Parker, of Grand Rapids, Michigan, demonstrate at the Michigan meeting. He has a die and a counter-die made, I believe, out of malleable iron. That is turned up in circular form. It is a cylinder, and on the inside is turned out with a lathe to within a reasonable distance of the bottom. Then the turning comes down nearly or quite to a point. Then he has a piston which is turned on the outside to exactly fit on the inside of this. That is turned out on the inside right the reverse from this. Then he takes his impression in plaster, and with some fusible metal casts a model directly from the impression. He fills the base of the inside of the die with small shot, No. 12, I think, up to where the base is large enough to set his model on. Then he works the metal out of which he is going to make the plate fairly well down over the die, setting it in on that base of shot. He covers it well over with shot, introduces his piston in on the top of that, and by malleting down the top he gets as perfect an adaptation as you can get by any other method of swaging. He simply has a fusible metal die, without any counter-die. He has no cores to make, and no casting in sand, or anything of that sort.

SECTION I.—Continued.

*A Method of Making Appliances for Correcting Irregularities of the Teeth. Method of Retaining Teeth that have become Loose from Pyorrhea Alveolaris, and those that need to be Retained after Regulating; and a Method of Making a Suspension Plate to Support Artificial Teeth without causing Pressure on the Gums.**

PAPER BY V. H. JACKSON, OF THE SECTION.

BEFORE speaking of the method of making appliances, as indicated by the title of this paper, I will read the notes I made of the first case we are about to consider.

Mrs. E., a lady in society, was referred to me in November, 1893, for advice regarding her teeth. I noted the following history: Age thirty-eight years; lower jaw prognathous (with the lower incisors closing in front of the upper ones); the other teeth articulating in nearly a normal position. Five teeth had been extracted, all of them molars. There remained in the upper arch four molars (two on each side), and three in the lower arch (two on one side and one on the other). The crowns of the superior left first and second bicuspids had been removed and porcelain ones substituted. The crown of the first right superior bicuspid was absent, and an all-gold one was in its place. The gum about the lower incisors was receded and diseased. The right lower central incisor was somewhat loose, and was moved outwardly by the superior incisors in closing the teeth together. The labial side of the superior incisors was considerably worn, and appeared stubby. The upper lip was sunken, and the facial line was not good. The patient observed that each year the lower incisors were closing higher in front of the upper ones. There had

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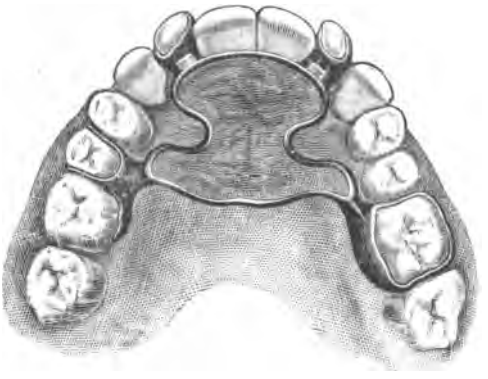
been an unsuccessful attempt to correct the irregularity when the patient was about twenty-eight years of age.

After acquiring the above history, my attention was directed to the consideration of the probable result if the irregularity of the teeth should not be corrected. With the assistance of the models, it was determined that unless there was interference the lower incisors would gradually be forced to take a more prominent position, and one or more of them would soon be so loose as to necessitate their removal; the lower jaw meanwhile would become more prominent, the upper lip more sunken, and the superior incisors more worn. On the other hand, several important advantages would be gained by correcting the irregularity. The wear on the

FIG. 1.



fronts of the superior incisors would be stopped. The corrected articulation would assist mastication, and proper use would improve the nutrition of the parts. The lower incisors would have more support by being pressed back into the arch, rather than forward as before. The profile would be improved by removing the sunken appearance of the upper lip, and the prominent effect of the lower jaw would be lessened.

After carefully considering the many points involved, including the age (thirty-eight years), tendency to disease of the gums, and the conditions enumerated, I recommended that the superior incisors be moved forward so that they would rest in front of the inferior ones. The patient expressed herself as desirous of having the work done.

I made an appliance of German silver, Fig. 1, and arranged a "crib-spring" to anchor it to a tooth on each side of the arch. The

anchorage was made similar to that described in detail in a paper I read before this Association at Saratoga in August, 1891, and which I will again refer to briefly, in connection with the method of making this appliance.

A "partial clasp" was formed to the palatal side of the superior left first molar, and a "crib" wire, No. 21 Brown & Sharpe's standard wire gauge, was shaped to pass across the labial side of the molar, at the gum line, with the ends bent to extend over the arch at the junction with the adjoining teeth, and made to rest on the "partial clasp," the effect of which was to clasp the molar for anchorage on that side of the arch, and a similar "partial clasp" was arranged on the palatal side of the superior right second bicuspid and first molar, with a "crib" wire passing around the bicuspid for anchorage on the other side. It will be observed that with this arrangement, the anchorage did not come in contact with or interfere with the artificial bicuspid crowns.

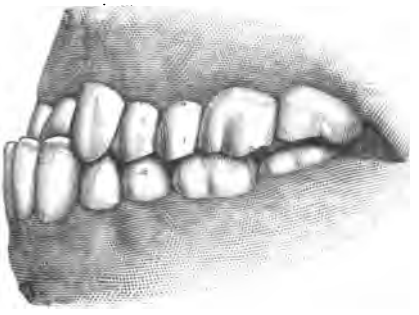
A base-wire, No. 14 in size, was bent to follow accurately the contour of the palatal arch from side to side, passing across the arch at about the line of the mesial surface of the second bicuspids. One end of the base-wire was then bent back nearly to a right angle, and the other bent forward so as to rest on the "partial clasps" described. A spring wire No. 19 was formed into a slight curve to rest on the lingual side of the incisors, reaching from the cuspid on one side of the arch to the cuspid on the other side. The ends of the wire were then bent with a small-sized clasp-bender backward, and again forward to form a loop, about one-fourth of an inch long, opposite the first bicuspid on each side. The loops were made to point toward the median line of the arch, with the free ends extending backward across the "partial clasps" with the ends of the base-wire. The different parts were then united to the "partial clasps" with soft solder, by laying a piece on one of them large enough to do all of the soldering at once, using chlorid of zinc as a flux, and melting with a hot soldering-iron. The parts were then smoothed with a carborundum stone and polished the same as we polish a metal plate.

In this case (as in others I have previously described) I did not arrange the appliance to open the bite. It is not necessary in the majority of cases.

A gold and platinum collar No. 33 gauge, with a large lug, made by soldering a piece of wire to the lingual side so that it would rest near

the gum, was cemented to each of the lateral incisors, to retain the spring of the regulating appliance; and when the regulating was about one-half completed, a similar collar was put on one of the central incisors. The action of the appliance was controlled by opening the loops in the spring wire.

FIG. 2.



The regulating was begun December 1, 1893, and the superior incisors had been moved forward to close in front of the inferior incisors on December 29, being twenty-nine days. The appliance without change was kept in position to retain the teeth until January 18, 1894, when it was removed. Figs. 2 and 3 show in profile the conditions

FIG. 3.

before and after treatment. It will be remembered that the lower incisors were loose from pyorrhea alveolaris, one of them especially so.

After removing the appliance, the tendency of the superior incisors to return to their original position made pressure inward on the inferior incisors, causing them to crimp. That is, some of them took

a position slightly in advance of others. This tendency was corrected by grooving longitudinally the approximal sides of the loose incisor, and rounding the sides of the two adjoining teeth to fit into the grooves, and flattening slightly the approximal sides of some of the other incisors. By this arrangement both the superior and inferior incisors were well retained in position.

When I last saw the patient, in June, the superior incisors were firm, and the inferior incisors were more firm and in a healthier condition than before the operation.

Fig. 4 illustrates a device for moving outward a right superior cuspid, that had erupted inside of the natural curve of the arch.

The foundation or base-wire of the appliance was made with a No.

FIG. 4.

14 wire in the same manner as described in making the appliance in Fig. 1, which was formed to cross the arch at about the line of the mesial side of the second bicuspids, following the palatal curve. The ends were anchored to a bicuspid on each side of the arch with a "crib" spring. A spring wire to move the cuspid outward was formed with the end to act upon the tooth made in the form of a letter S, with loops about three-eighths of an inch long; the other end curving back to cross the partial clasp upon the bicuspids and molar of the left side.

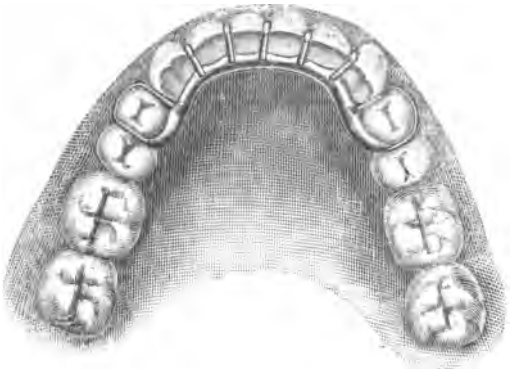
In the appliances before us, the advantage of having the base-wire cross the palatal arch, rather than follow the lingual curve of the teeth as I have described in previous papers, is apparent. If the base-wire or any part of the appliance needs to be made more rigid, two or more wires can be formed to run parallel on the model, and united with solder. Occasionally a more satisfactory result may be

obtained by fitting a thin piece of metal underneath the wires on the model before soldering.

I will now present a model, with an appliance, describing a removable device to be worn constantly for retaining teeth that have become loose from pyorrhea alveolaris. It can be also used to retain teeth that have been regulated. (See Fig. 5.)

Before making the model on which to make the appliance, any of the teeth that have elongated should be dressed with a carborundum stone to correspond in length with the adjoining ones, being careful not to injure the pulp of the tooth. A model of the arch of teeth is then made and trimmed accurately, and if only the lower incisors are to be retained, a small base-wire, either round or half-round, is

FIG. 5.



formed to the lingual curve of the arch, not touching the gum, extending to a bicuspid on each side, to which the ends are anchored with a "crib" wire passing over to the labial side of them as described in making "crib" appliances. A mark is then made on the model about one-sixteenth of an inch above the base-wire, from one side of the arch to the other. The base-wire is then removed.

A thin piece of metal about one-eighth of an inch wide, and long enough to reach from the anchorage on one side of the arch to the anchorage on the other, is fitted to the lingual side of the teeth to be retained just below the line marked on the incisors, using a metal instrument or pointed piece of wood or ivory to bend it into the depressions between the teeth. In effect this metal is similar to the "partial clasp," and for convenience we will term it a "continuous partial clasp." The base-wire is now replaced, having the "contin-

uous partial clasp" between it and the model, with the upper edge projecting above the base-wire.

A short piece of small wire, or flat metal, with the end curved in the form of a hook, is formed to pass from the base-wire to the cutting-edge, at the junction of two of the teeth, where the hooked portion passes over the arch to the labial side, extending about one-sixteenth of an inch toward the gum, or as far as is necessary to retain them, fitting into the depression formed by their convex surfaces.

The groove at the junction and cutting-surface of the incisors can be deepened if desired, sufficiently to let the curved portion of the wire remain flush with the cutting-edge, or the wire can be flattened with a carborundum stone on the outer or inner side for the same purpose. As many arms of this kind as are required can be fitted to place in the same manner, the end always extending onto the "continuous partial clasp" to touch the base-wire. The arms and base-wire are then joined with solder to the "continuous partial clasp." If soft solder be used for the purpose, the arms can be held by pressing down on the curved portion with paper or a wad of cotton, and the soldering done with a soldering-iron. If gold or silver solder is to be used, the model should be made of plaster and marble-dust (or their equivalent), and the several parts held in position by flowing some of the plaster mixture over the wires at any place that will not interfere with the soldering. An arm should extend over the arch each side of each loose tooth, to prevent their tendency to separate and rotate. If the teeth be close together, one arm at the junction of two teeth will hold that side of each of them.

If the teeth have become separated, they can be drawn together, and the appliance made to hold them in that position. If there is a space between them, an extra arm can be made to extend to the cutting-edge like the one described, or the end of the arm can be broadened by soldering a flat piece of metal to it in form to rest on the labial side of the adjoining teeth. If preferred, a short arm can be made to extend through the space in the form of a slight hook, the end of which should rest on the labial side.

An appliance made in the manner described in the foregoing can also be utilized for holding loose cuspids, bicuspids, or molars. It is rather more practicable for the lower than the upper arch; however, it can often be utilized to good advantage in the upper arch, and will prevent the elongation and separation that are inevitable without treatment.

If the teeth have separated and elongated, the use of an eyelet in

the palatal side of the tooth, with an apparatus made as I have described in clinics and in the Transactions of the World's Columbian Dental Congress, may be more useful in the upper arch.

If a loose incisor that has been retained with an appliance the foundation of which is a base-wire, should become entirely separated from its alveolus, a plate tooth can be fastened with solder to the base-wire, and made to fill the space by making a backing for it and soldering as described in constructing the appliance. (See Fig. 6.)

Occasionally a patient prefers to have the natural tooth replaced. In such an event the root should be removed, leaving the crown the proper length, the pulp-canal filled, a backing fitted to it, holes drilled through the backing into the tooth, and pins inserted.

If soft solder be used for uniting, the natural tooth will not be injured by the required heat; but if gold or silver solder be used, which requires a higher heat, the backing and pins should be held in place

FIG. 6.

with wax, and the tooth removed. Plaster and sand is then run about the parts, to hold them in position while soldering. After soldering, the pins should be serrated with a sharp instrument, and the tooth cemented to place with oxyphosphate of zinc.

If a plate tooth be used it should have a backing, and be held in place for soldering the same as in making a metal plate.

I call this device a "suspension plate." If the gum is unhealthy, it has several advantages over the ordinary plate. It is suspended from the teeth, causing no pressure on the gum, which should be avoided in cases of pyorrhea alveolaris, especially while under treatment. It holds the loose teeth in position, which makes them useful, and at the same time supports the artificial one.

If a loose tooth has a space on each side of it, it can be retained by fitting a "partial clasp" on the lingual side, above and below the lingual prominence of the tooth, which will prevent it from rising out of the socket, and arranging a "crib" wire to cross the labial side of the tooth at any place advisable, with the ends extending either side, and upward somewhat toward the cutting-edge, then downward on the lingual side, which in effect will make a spring of it. The ends are then to be bent toward each other to rest on the "partial clasp,"

and both should be attached to the base-wire with solder, and anchored with "crib" attachments as previously described. If the "crib" wire is arranged to cross near the neck of the tooth, or near the cutting-edge, the "partial clasp" should extend on the lingual side a little beyond the level of the "crib" wire on the labial side, to assure a correct line of resistance, so that the pressure of the "crib" spring will not change the position of the tooth, but hold it firmly against the "partial clasp." Another method is to extend an arm of wire or flat metal from the "partial clasp" through the space on either side of the tooth, with the ends in the form of a hook, to rest on the labial side.

If the gum has receded, exposing the necks of two or more loose incisors, and the lingual prominence is well defined, an appliance can be made to support them by fitting a "continuous partial clasp" on the lingual side to cross them, and broad enough to extend a little above and below the prominence or cingulum. Then arrange a spring-wire to cross the labial side of the teeth, with the ends passing over the arch, usually at the junction of the lateral incisor and cuspid on each side, to be attached to the "continuous partial clasp" with solder, which will also make the "continuous partial clasp" more rigid.

An incisor from which the gum has receded but which is strongly attached in the socket, though movable and interfering with the articulation of the teeth, can be held in place by fitting a "partial clasp" to the lingual side of the model of the tooth, extending as near the gum and cutting-surface as is necessary to make a good anchorage, with the ends narrowed and made to project onto the lingual sides of the adjoining teeth, the effect of which, when the appliance is adjusted, will be to prevent the loose tooth from moving forward. A "crib" wire is then made to cross the labial side of the loose tooth, with the ends extending over the arch either side to the "partial clasp," to which it is soldered. The sides of the "crib" wire should project slightly onto the labial surface of the adjoining teeth, to prevent the loose tooth from moving backward.

These devices are often serviceable for retaining teeth that have been regulated. Vulcanized rubber can be used for uniting the wires if desired.

Another appliance that is worthy of consideration for retaining loose incisors is made as follows: a base-wire is formed to the lingual curve of the arch, with the ends anchored with a "crib" wire

to a bicuspid on each side. A spring-wire is then formed to fit the labial side of the incisors, with each end bent sharply to a right angle at the junction of the lateral incisor and cuspid, to extend over the arch to the base-wire to which it is soldered. A "continuous partial clasp" can be arranged on the lingual side, and attached to the base-wire, if necessary to prevent the teeth from rotating. The appliance is easily removed by the patient for cleansing.

It is unfortunate that we have no general means of retaining teeth which have become loose from pyorrhea alveolaris, except by the use of metal, which is usually objectionable in appearance. The method that I have devised which is the least noticeable in this respect, is made by forming a small "continuous partial clasp" of thin metal on the model, on the lingual side of the incisors near the cutting-edge, crossing the loose teeth, and extending onto those that are sufficiently firm to support them. Solder is then flowed over the "continuous partial clasp" to stiffen it.

If during mastication much pressure is to be brought upon the incisors, the thin metal of the "continuous partial clasp" should be swaged to extend onto the cutting-edge of the teeth, and solder flowed over the outer side to stiffen it as described. A small hole is then drilled between the natural teeth that are to be retained, with a pointed enamel-drill, and near the cutting-edge if their shape will permit. The "partial clasp" is then applied, and with a slightly smaller drill the hole is extended through it while it is held in position. A small round (or oblong) head, similar to that of a common pin, is formed on a wire of suitable size to enter the hole drilled between the teeth. A thread is then cut on the wire, and in the hole in the "continuous partial clasp" in which it is to screw. A small groove is cut in the head of the screw to assist in turning it to place.

To recapitulate: first, the ends of the "continuous partial clasp" should be held in place with a screw in the manner described, then the holes drilled, and the screws arranged between the intermediate teeth. After all of the parts have been fitted to place, the rubber-dam should be applied, and a slow-setting oxyphosphate cement should be spread on the inner part of the "continuous partial clasp," which is put in place, and the screws adjusted before the cement hardens. If there is a separation between the teeth, a thin piece of metal can be arranged to span the space and project slightly onto their labial surfaces. The metal can then be thickened with solder, a hole drilled through the center, and a screw inserted the same as described.

DISCUSSION.

DR. RHEIN: Dr. Jackson spoke incidentally of metal in describing his appliances. I would inquire if he prefers any special kind of metal, or does he leave that to the discretion of the individual operator?

DR. JACKSON: If Dr. Rhein is familiar with what I have written regarding my system, he will remember that I have advised the use of spring gold or German silver in all cases where they can be utilized. Piano-wire, however, is the best spring that we have. It is tougher, and will stand any amount of twisting and bending, but it is liable to corrode in some mouths. I use it only where the best spring is needed. German silver, if properly drawn through a draw-plate, makes an excellent spring. If overdrawn, it is brittle, and if there are many sharp angles to be made in the spring, gold or some metal that will not break so easily is preferred. For such appliances as I have recommended for holding loose teeth, I should recommend spring gold, or iridio-platinum wire. There is no objection to the use of German silver soldered with soft solder, excepting, perhaps, where a piano-wire spring is used in connection with it, and there is an excessive acidity in the mouth. It is an advantage to use soft solder in uniting the parts of the appliance, as the heat in soldering is not sufficient to impair the temper of the springs.

DR. HOLLY SMITH: I should like Dr. Jackson to call attention to the tinning of these appliances.

DR. JACKSON: Where a piano-wire spring is used in connection with a regulating appliance, its liability to corrode is lessened by being properly tinned. This is best done by bending a polished wire into the shape of the spring desired, and dipping it into a weak solution of muriate of zinc, and then plunging it into molten tin, removing it endwise; the oxid on the melted tin having been previously removed. If the wire is tinned before being shaped into the spring, the pressure of the pliers in bending cuts through the coating of tin, which exposes the steel and permits corrosion.

DR. CRAWFORD: I would like to ask Dr. Jackson what he thinks of the propriety, after his appliance is constructed and the teeth in position, of removing some of the other loose teeth, thoroughly cleansing them of calcareous deposits, and replanting them before permanently adjusting the appliance.

DR. JACKSON: A tooth that has once had a calcareous deposit on the root cannot, I think, be successfully replanted; that is, it will not

remain firm in the socket for any length of time. If you will consider the condition of the histological structure of the cementum, you will remember that it receives most of its nutrient support through the vessels from the peridental membrane, and that some of the canals in the surface of the cementum are large. When calcareous matter is deposited on the root, it penetrates these canals to some extent, and I do not think it can all be removed by ordinary methods. In my judgment, a replanted tooth is held in the socket mechanically by the granular tissue that enters the canals. This will be readily understood by those having had experience in sponge-grafting. The natural entrances to the canals have smooth, rounded edges. The root of a replanted tooth that has any crystals of calcareous matter deposited on the orifice of the canals of the cementum, or which is roughened by filing, scraping to remove the periosteum, or injured by the forceps in extracting, will irritate the soft tissues that shrink around it, which will induce inflammation and encourage its absorption.

Some of our teachers have told us, and we find in the writings of John Hunter, that better results are obtained by the implanting of teeth without removing the peridental membrane. In my experience in replanting and implanting, it does not matter if the peridental membrane is removed, but it is all-important that there shall be nothing that can irritate the soft tissues, and especially of the two-thirds of the root toward the neck.

DR. MORGAN: I rise to a point of order. The doctor has invaded the field of pathology, which I understand will come up at a future time.

THE PRESIDENT: The doctor answered the question, and then proceeded to explain his method of implanting. The point of order is technically correct.

DR. MORGAN: What do you mean by spring gold?

DR. JACKSON: Gold that is sold by dental dealers as spring gold —platinized gold.

DR. MORGAN: The best spring gold I have ever used was made by the introduction of one-tenth of platinum into pure gold. Gold twenty-two or twenty-three carats fine, with two pennyweights of platinum to the ounce, drawn through a plate, makes the best spring gold I have seen. It anneals very readily, but if you heat it in working it you lose the spring.

DR. JACKSON: In reply to Dr. Morgan I will say, that what we

require is a metal that is equal or superior to steel as a spring, and which is non-corrodible. I am experimenting in that direction, and hope yet to produce something desirable.

DR. W. O. KULP: I should like to make a few remarks upon the latter part of this subject,—*i.e.*, in reference to cases where the incisors have become loosened from the absorption of the alveolus, either from deposit of salivary calculus, or non- or mal-occlusion. The method which I employ in staying them in position is as follows: Instead of using the bar on the lingual surface and fastening the teeth to the bar, I take the measures of the teeth in the usual way for crown-work, having the bands extend over the entire surfaces of the teeth, then fit them on to the teeth just as though I were going to put on a full cap crown, bringing it down to or below the margins of the gums, then cutting off the outside, exposing the labial surface of the teeth to the cervical third. After the bands have all been fitted, I take an impression (of the labial surface) with plaster, carefully removing it, then removing the bands and placing them back into the impression, and filling the impression; then soldering these bands together on the lingual side, clear up to the cutting-edge of the teeth, so that the entire lingual surface is covered with the bands. Some persons prefer the color of platinum, while others prefer gold; either can be used for bands. I think in this way we have less appearance of metal, only showing the narrow rim of metal on the cervical third and between the teeth. We have in addition to this, the entire lingual surface being covered, strength enough to hold every tooth in place under any amount of hard usage. After thoroughly polishing the case, it is put on with cement in the same manner as a bridge. I know of patients who have worn such appliances for fifteen or twenty years, where the teeth were so loose that they had to be held in order to get the bridge on.

Appliances can be made in this way for fractures of the jaws. I call to mind a case with a fracture in the center of the lower jaw, for which I made bands similar to those described, extending them over each tooth from cuspid to cuspid. They were made of platinum, because of its ease of manipulation. After placing the bands upon the teeth, the fracture was adjusted and held in position until the impression was taken, when the bands were removed from the teeth and placed back in their proper position in the impression; it was then filled. After removing the impression I had a perfect model of the jaw with the fracture adjusted. The bands were then united to each

other with coin gold, made very strong ; after finishing, it was adjusted on the teeth and cemented fast. The fractured ends of the jaw were held firmly in perfect position, and no other bandage or splint was used in the case. The patient wore the appliance for about six months. I then sent the patient to the surgeon for inspection, to see whether there was osseous union ; he reported it a perfect success. This form of splint has been used in many other cases of fractures of both the upper and lower jaws with equal success.

SECTION I.—Continued.

Automatic Pump.

DESCRIPTION BY J. N. CROUSE, OF THE SECTION.

THIS pump which I will describe works by water pressure. It is a modification of the pump used by surgeons to get the compressed air into the cylinder, but it is on a larger scale. I am trying to have it made more economically. I have put two of these pumps in my cellar. I have my sixty-gallon air-cylinder there, and as soon as the stop-cock is opened, and the pressure in the cylinder is reduced, these pumps start, and continue to work until the pressure is restored to about sixty-five pounds. So that you can run any kind of a continuous-gum furnace or a furnace where you want a blast. The air is piped up to my laboratory table, and there I have the stop-cock arranged so that I can get any amount of air I wish from the tube. In order to be sure to have enough air to work a continuous-gum furnace, I have two of the pumps. They work splendidly, and are in every way right, except that they cost too much money. I am trying to get the manufacturer to make them in a smaller form, so that they will cost less money. We hope to handle them eventually, so as to be able to do ourselves and others some good. At present they cost $25, and I told the manufacturer he must get them down to $15, so that two of them could be had for $30.

DISCUSSION.

DR. KULP: Professor Hunt has invented a little air-pump which is simply attached to a water pipe, and which probably costs about four or five dollars.

DR. CROUSE: Is that the beer-pump?

DR. KULP: It is taken from the beer-pump idea.

DR. CROUSE: You don't get pressure enough from that to run a continuous-gum furnace.

DR. KULP: You do from this.

DR. CROUSE: He must have enlarged it. I first had the compressed air arrangement made by hydraulic pressure, such as is used, I think, in the University of Pennsylvania; that is, a lead pipe running up, the upper part larger than it is below. It carries the air down with the water, forcing it in. It is very good, except that as soon as you get a certain pressure, the force of the air overcomes the water and fills your cylinder up with water. So that was a failure in that respect.

SECTION I.—Continued.

Bridges.

PAPER BY WM. N. MORRISON, OF THE SECTION.

BRIDGE-WORK, or more properly inter-dental section, of a most durable form and very satisfactory to the patient, is made by securing the crowns to the abutment teeth, thoroughly fitted to the gum-margins and crowns standing at the angle, which will render it possible to be removed and reset with cement when the bridge is finished.

Take the usual impression of that section of the gum and the articulation of the occluding teeth (with crowns in place) in plaster; fill the crowns and pour the ridge of the gum, of any suitable material (marble-dust or sand and plaster) to stand the heat of soldering. Notch the ends of the cast, or make articulating spuds into which to pour the plaster, for the articulation.

Break out the impression material and adjust the articulating face of bridge or section composed of two layers of platinum gold (24 gauge) sweated together, and fitted accurately to the ends of the crowns (which are made of coin gold), leaving it a little wider toward the buccal face of the section and as wide toward the palatal surface and in as straight line between the crowns as is necessary for the occluding teeth.

Solder a sixteenth or an eighth-inch square or triangular piece of No. 24 gauge platinum gold at suitable intervals along the bar for cusps to facilitate mastication; retain this in position with each crown with a little wax, and adjust a thin piece, about No. 30 gauge, of crown gold from the palatal or lingual face of section, fitted nicely to crown at each end, well in toward the ridge of gum, so that when the porce-

lain faces are adjusted to the bridge the width across the foot of the section will not exceed a quarter of an inch.

Now solder to these headed platinum pins at proper intervals for strength, but so placed as not to be in the way of the platinum pins in the teeth. Readjust these pieces to the crowns, and retain them with a little plaster, or asbestos and sand, or marble-dust, and solder at each end and the joints along the line between the gold and platinum gold; pickle thoroughly in acid, adjust it to the mouth, and take another impression of the ridge, which should be poured in plaster, and adjust porcelain shells accurately at the gum edge, and grind to fit the gold at the masticatory edge; set them in proper alignment, invest so as to lift the wax out from the ridge line of bridge, and pack the rubber in by the same directions. When finished, polish on lathe and set with cement in the usual way, resting a slight margin on the gum between the crowns. This is the most cleanly, and for enunciation and mastication a most effective appliance.

SECTION II.

DENTAL EDUCATION, LITERATURE, AND NOMENCLATURE.

REPORT BY LOUIS OTTOFY, CHAIRMAN OF THE SECTION.

MR. PRESIDENT AND GENTLEMEN: The Section on Dental Education, Literature, and Nomenclature begs leave to offer the following as its annual report:

I. Education.

In view of the fact that no reports were presented from any of the Sections at the meeting of this Association last year in Chicago, the present report covers the period of two years, or since the meeting of 1892.

It has been the custom of this Section since 1887 to report annually the number of dental colleges in active operation in the United States. At the close of the session of 1892 the total number of colleges in operation and granting degrees was thirty-nine. There have been established since that time the Atlanta Dental College; Birmingham Dental College; Ohio Medical University (Columbus), Department of Dentistry; University College of Medicine (Richmond), Department of Dentistry; Marion-Sims College of Medicine (St. Louis), Dental Department; Tacoma College of Dental Surgery; Milwaukee Medical College, School of Dentistry; Dental Department National Homœopathic Medical College, Washington; and New York Dental School; making a total of forty-eight schools. This number has been reduced, however, by the discontinuance of the United States Dental College, Chicago. The Tooth-Saving Dental

College, of Chicago, has changed its name to the "Columbian Dental College." So that at the present time the number of schools in active operation and granting degrees is forty-seven.

The following is the number of "Matriculates," "Students in Attendance," and "Graduates," as reported by each school for the session of 1893–94 :

	Matriculates.	Stud. in Att'dance.	Grad.
ALABAMA.			
Birmingham Dental College	27	24	3
CALIFORNIA.			
University of California, College of Dentistry	113	107	18
COLORADO.			
University of Denver, Dental Department	16	*	3
DISTRICT OF COLUMBIA.			
Dental Department National Homœopathic Medical College	*	*	*
Columbian University, Dental Department	44	*	4
Howard University, Dental Department	11	*	*
National University, Dental Department	23	*	8
GEORGIA.			
Atlanta Dental College	118	116	26
Dep't of Dentistry, Southern Medical College	31	24	4
ILLINOIS.			
American College of Dental Surgery	274	258	44
Chicago College of Dental Surgery	332	313	58
Columbian Dental College	*	*	*
German-American Dental College	*	*	*
Northwestern College of Dental Surgery	*	*	*
Northwestern University Dental School	94	*	24
INDIANA.			
Indiana Dental College	104	102	23
IOWA.			
Dental Department, State University of Iowa	148	143	31
KENTUCKY.			
Louisville College of Dentistry	91	*	9
MARYLAND.			
Baltimore College of Dental Surgery	145	132	37
University of Maryland, Dental Department	134	*	34
MASSACHUSETTS.			
Boston Dental College	145	*	33
Dental Department of Harvard University	63	*	18
MICHIGAN.			
Detroit College of Medicine, Department of Dental Surgery	43	*	1
University of Michigan, College of Dental Surgery	185	*	64

	Matriculates.	Stud. in Att'dance.	Grad.
MINNESOTA.			
University of Minnesota, College of Dentistry	40	*	6
MISSOURI.			
Dental Department, Marion-Sims College of Medicine	*	*	*
Kansas City Dental College	113	111	16
Missouri Dental College	94	*	21
Western Dental College	105	*	26
NEW YORK.			
New York College of Dentistry	294	280	62
New York Dental School	*	*	*
University of Buffalo, Dental Department	86	*	6
OHIO.			
Cincinnati College of Dental Surgery	21	8	5
Cleveland University of Medicine and Surgery, Dental Department	23	*	4
Ohio College of Dental Surgery	151	140	34
Ohio Medical University, Department of Dentistry	23	22	*
Western Reserve University, College of Dentistry	30	*	4
PENNSYLVANIA.			
Pennsylvania College of Dental Surgery	282	252	68
Philadelphia Dental College	299	279	77
University of Pennsylvania, Department of Dentistry	227	219	81
TENNESSEE.			
Central Tennessee College, Meharry Dental Department	10	*	3
Tennessee Medical College, Dental Department	*	*	6
University of Tennessee, Dental Department	47	43	20
Vanderbilt University, Department of Dentistry	128	126	24
VIRGINIA.			
University College of Medicine, Department of Dentistry	22	*	*
WASHINGTON.			
Tacoma College of Dental Surgery	*	*	*
WISCONSIN.			
Milwaukee Medical College and School of Dentistry	*	*	*

* No report.

According to these statistics, there were matriculated as students of dentistry during the past year 4136 persons, upon 905 of whom the dental degree was conferred during the present year.

In the report of this Section made three years ago the statement was put forth that at that time the largest proportion of graduates, namely three-fourths, were passed by twelve of the then existing thirty-three colleges. Two years ago ten of the colleges graduated 851 students, while the remaining twenty-eight colleges graduated 632. This year, out of 905 from all colleges, 559 graduated from ten of them, while 26 colleges graduated 346.

The following table indicates the increase in the number of graduates since 1886:

1886	503	1891	1241
1887	597	1892	1483
1888	746	1893	
1889	796	1894	905
1890	963		
		Total	

The decrease in 1893 and 1894 is due to the operation of the three-year course.

A careful examination of the present dental school system of the United States reveals the fact that the conditions are more favorable now than at any time in the past. The National Association of Dental Faculties is in a great measure responsible for the marked development and advancement that have been made, and this Section has not been neglectful in the past in recognizing the merit of this voluntary conference body. With probably one single exception, there is not now a college in this country which traffics in dental diplomas. While it is true that not all of the schools possess the best of equipment or the best of teachers, all of them feel that they cannot attain or maintain prominence or standing unless they conform to the rules of the National Association of Dental Faculties, even though they may not be members of it. At the present thirty-two are members, those not yet on the roll being principally the institutions recently organized. These schools, appreciating the beneficial effects of membership, endeavor to conduct themselves with that end in view.

The Section desires to call attention to the fact that the present time is most propitious for the introduction into the dental educational system of this country of improvements and reforms which will tend

to an elevation of the professional standing. During the last ten years the number of dental schools in the United States has doubled, and the tendency under the lax State laws—each State being a sovereign—is to increase the number of colleges, and we believe that the increase in the future will be even greater than in the past. If every new college organized has as its motive the education of students in a more thorough and more efficient manner than by those now in existence, all encouragement should be given to the industry. But at the present time the fad is to establish a dental department in connection with previously existing medical schools, which is an inexpensive, harmless method of rapid production. In some instances this does not even require an additional charter, that power being already inherent in the medical college, while in others it is an exceedingly simple matter. Many of the necessary educational chairs being established, it is only required to add three or four dentists to the faculty, set aside two rooms in the college building for an operative and technique room, and the thing is done. While it adds revenue to the medical college, it does not generally add to the luster of the dental profession. At present twenty-seven of the forty-four dental colleges are operated in conjunction with medical departments. It is not the desire of the Section to deprecate such a condition, for many of the schools thus connected are among the best of the country ; but it should be borne in mind that there are more than two hundred and fifty medical colleges in the United States, and the addition of a vermiform appendix to each of these may fasten upon the dental profession a dangerous disease.

A radical change for the admission of students is the first vital demand. The method now in vogue, which permits every school to be the judge of the fitness of the candidate for admission, is faulty in many respects, and results in the admission to the ranks of the dental profession of many whose fitness may be questioned with propriety. We believe, and urge, that the requirements for admission should consist in the possession of the degree of Bachelor of Arts or its equivalent, provided that it is obtained from a reputable university.

The second important step to be taken is the extension of the school year to nine months and of the entire course to four years. Allowing the time for vacations, the grace at the opening of the college course of a six-months' school, and the time lost between examinations and graduation, it is possible under the present rules to complete a dental education on the part of one who has not *actually* devoted more than twelve months to the study of dentistry.

It is also time to take notice of the action of foreign countries toward the graduates of American dental colleges. One by one, foreign governments have so framed their laws regulating the practice of dentistry that the graduates of American schools are excluded from entering their domain. So far as the fitness of graduates of American dental schools to practice dentistry is concerned, there is no doubt that for actual benefit to the patient in search of dental service the ability of the American is not equaled by the product of any foreign dental school in the world. In view of the restrictions placed about those endeavoring to practice in foreign lands, especially as to a thorough knowledge of the respective native languages, it is only proper that we should demand on the part of foreigners, as practitioners or students, compliance with the rules and customs that prevail in this country, among them a thorough acquaintance with our own language. Dentistry should be taught, and examinations on the part of State boards of dental examiners and college faculties should be in English only. It is but fair that we should expect of others as much as is expected of us. Credentials presented by foreigners should be scrutinized with the utmost care, and should be passed upon by competent persons who are, if possible, familiar with the methods in vogue at the particular institution whence the credentials have issued.

The past two years have been prolific in the presentation before societies of papers relating to dental education. The subject was also exhaustively treated before the World's Columbian Dental Congress, in Chicago, and the Dental Section of the Eleventh International Medical Congress at Rome. These papers and discussions contain many suggestions which are not feasible, while many of the points raised are deserving of further investigation.

It has been stated that a dental college cannot do justice to a larger number of students than those with whom the teachers and demonstrators can come in actual contact. Large classes have led to their division into sections, and in some instances even the sections have become too large, and even the division into sub-sections makes it impossible to do justice to each and every individual. The assignment, for instance, to the extracting room, to which the juniors and seniors are entitled (in some instances the seniors only), results in giving a graduate probably one or two days' actual practice. An analogous condition obtains in other departments, and the idea of limiting classes to the facilities of the schools, or enlarging the facilities to meet the demands, are important questions, deserving careful

consideration. If it is impossible, in the nature of the case, to supply an exceedingly large class with clinical material, the student may justly ask whether it was proper to admit him. It seems that in some instances the number of teachers, or at least the number of demonstrators, should be increased, while in places where it is impossible to supply the clinical material, the student should be advised to obtain privileges for practical work under the tutelage of practitioners.

The point has been raised whether it is advisable for a student to change schools,—that is, to attend the three courses in one, two, or three schools. While there seems much in favor of that plan, we believe that the disadvantages outweigh the advantages. In the first place, there is no uniformity in the schedule of the lecture courses, and hence the student who has changed from one school to another is sometimes compelled to omit some part of his curriculum entirely, because, perchance, the lecture which he should attend is being delivered at the same hour when some other work assigned to him in the new school should also be attended to. The most advantageous method for the student is to select a good school, and then commence and finish his course there.

Attention has also been called to the habit of undergraduates engaging in the practice of dentistry. This is no doubt an evil which it is difficult to control. It is not strictly and properly one which comes within the power of the college. Still, there is no doubt that the school must be able to exercise a wholesome influence in this direction. This ought to be readily controlled in connection with another objectionable matter,—that is, the unethical practices of the profession. A few of the colleges have introduced the practice of "requesting"—some probably demanding it—candidates for graduation to sign what is substantially the Code of Ethics of this Association. While this may prove to be a restraining influence upon those about to receive the degree, it seems to be brought in at the wrong end of the line. It should be required of a student before he is permitted to matriculate that he should sign a contract practically embodying the following, to be enforced as far as is practicable. We have secured legal opinion to the effect that most of the provisions can be enforced in the majority of States :

1. That he is not now and that he has not been for the two years last past engaged in the practice of dentistry conducted on principles not in accord with the accepted code of the profession. That he is

not and has not been, for the period named, engaged in any office so conducted. That he has not had any interest, financial or otherwise, in an institution or office or practice of that kind. That he has not violated the dental law of any State or States in which he has practiced during the same period.

2. That he agrees, during the time from the date of his matriculation to the day of his graduation, to conduct himself according to the code, to obey the dental law of the State where he resides for the time being, and that he will not engage in the practice of dentistry unlawfully. That any violation of this agreement shall entitle the college to remove his name from its records, and that this action shall be reported to the other colleges in the United States.

3. That he will accept a diploma, to be held during good behavior only, with the understanding that the college shall have a right to cancel it, and to remove his name from the list of graduates, for any conduct whatsoever not in accordance with true ethical professional conduct.

The obligation to sign such an agreement in due legal form will draw to the college portals only the better element, and when coupled with a demand for the proper preliminary education of the candidate, will exert a wholesome influence upon the entire dental fabric of America.

We note a desire for a change of the degree. We are not prepared to say whether this step is a wise one. The argument has been made that the public is barely becoming acquainted with the D.D.S., and that the additional M.D.S., L.D.S., D.M.D., and D.D.Sc. are confusing, representing principally distinctions without differences.

One of the most important steps in dental education will be consummated, during this meeting of this Association, by the organization of a governing body on the part of the technic teachers of this country. Dental technics, as a feature of dental education, was introduced a few years ago by Dr. G. V. Black, of Jacksonville, Ill., and there is no doubt that the subject will become one of the absolute necessities of a dental student's education.

A plan which is being practiced with some measure of success, and which no doubt originated as a result of insufficient text-books, is the publication of outlines or questions and answers. These are practically synopses or brief *résumés* of the course of lectures to be delivered from a certain chair. Where they are used, they seem to supply a deficiency that is appreciated by teacher and student.

Post-graduate teaching is carried on by some of the colleges and by an association. The colleges teach practical work, while the Post-Graduate Dental Association's principal object, at present, is to improve those practitioners who have not the means or who are for any reason unable to attend dental colleges.

The Universities of Michigan and Minnesota have established a regular course covering one year, which is intended for graduates who desire to further perfect themselves in any particular branch.

The most important event during the past year, bearing upon dental education as well as upon all branches of dental science, was the World's Columbian Dental Congress. Looking at the result from this Section's standpoint, it is to be regretted that the opportunities were lacking to take steps toward the adoption of a uniform nomenclature.

The subject of popular education is constantly coming up, especially before dental societies, and there seems to exist, especially in some parts of the country, an imperative demand for the education of the masses. At present improvement in this line is accomplished by the publication and distribution of pamphlets, of which the latest and most complete is the *Dental Instructor*, published by the Isaac Knapp Dental Coterie, of Fort Wayne, Ind.

We do not believe that we are on the right course on this question of education of the public. This kind of education, or rather information, should be parceled out in small doses and at frequent intervals, but especially at exactly the proper moment. For instance, take a young man who is say twenty-one years old. If we give him a book or pamphlet to read, the probabilities are that he will not do it, and that if he would read it eight-tenths of the contents of the book would be totally useless to him. If he attempted to impart what he read to other people, it is likely that, not being a dentist, he would not impart it correctly or to the right individual. To him, the chapter on temporary teeth is as useless by being too late as is the chapter on bridge-work by being too premature. In other words, that information is just so much waste. To him enough information should be given to cover his case. This should be concise, and brief enough to read on the street-car. Give him to-day a slip referring to the cleansing of the teeth, which would teach him how and when to do it. At the next appointment give him a slip referring to the necessity of regular examinations of the teeth. In the instance supposed, that is all that is needed. Everything else contained in the book the young

man either knows or has no use for, or the dentist can take care of it for him. A child of seven years only wastes its time by trying to learn how to take care of artificial teeth, or in trying to master the conditions where bridge-work is advisable; while, on the other hand, a man of sixty is not going to be benefited much by learning all about the eruption of the temporary teeth. And so on all through the category of what makes up humanity.

During 1891 and 1892 this Section collected statistics relating to the number of dental societies in this country, but this work has not extended beyond the mere grouping of the names of the societies. It is the desire of the Section to extend this work with a view of securing reports from these societies relating to the scientific work accomplished by them during the year. As a model of such a report the following report of the Washington City Dental Society is herewith submitted:

To the American Dental Association, Old Point Comfort, Va.:

The Washington City Dental Society begs leave to submit the following brief of its transactions:

The Society now numbers fifty-three members.

Regular meetings are held on the third Tuesday of each month except July and August, and special meetings as occasion requires.

The attendance is good, interest increasing, and an upward tendency is evident.

Under the head of "Incidents of Office Practice," many interesting cases are reported, and almost every subject pertaining to dentistry is introduced and discussed.

In April, 1894, this Society joined the Maryland State Association in a union meeting in this city, which proved a most interesting and valuable affair, marked by an unusual amount of work of a high order, stimulating both Societies, strengthening social ties, and bringing out distinguished visitors from several States.

Since our last report, the following papers have been presented and discussed at our regular monthly meetings:

"Inter-Proximate Spaces," "Ambidextrousness," by Dr. H. B. Noble.

"Pyorrhea Alveolaris," "Dental Legislation," by Dr. Wms. Donnally.

"Professional Fallacy," "Pathology," by Dr. J. B. Hodgkin.

"Dental Legislation," by Dr. Walton.

"Riggs's Disease," by Dr. D. E. Wiber.

"Malignant Growths superinduced by Dental Irritation," by Dr. A. J. Brown.

"Is Dentistry a Profession or Trade?" "Cleansing Teeth," "Dental Nomenclature," "Non-cohesive Gold Cylinders: How and Where to Use Them," by Dr. L. C. F. Hugo.

W. M. HUNT, *Secretary.*

WASHINGTON, D. C., July 16, 1894.

II. *Dental Literature.*

The past two years have been prolific in the publication of dental books, the most notable of which is Dr. C. F. W. Bödecker's "Anatomy and Pathology of the Teeth." This, in the writer's opinion, is the most important work added to dental literature during that period. It is unnecessary to consume your time with reading a list of these publications, which will be appended to the report.

III. *Dental Nomenclature.*

The report on this part of the Section will be read by Professor S. H. Guilford, of Philadelphia.

The Section also reports a paper entitled "An Etiological Classification of Pyorrhea Alveolaris," by Dr. M. L. Rhein, of New York, and desires permission granted to Dr. T. E. Weeks, of Minneapolis, for the purpose of explaining the nomenclature of dental technics.

NEW PUBLICATIONS, 1893–94.

1. The Testimony of the Teeth to Man's Place in Nature, with other Essays on the Doctrine of Evolution.—Balkwill, F. H.

2. A Practical Treatise on Artificial Crown- and Bridge-Work.—Evans, Geo.

3. Orthodontia, or Malposition of the Human Teeth: its Prevention and Remedy.—Guilford, S. H.

4. Praktische Zahnlehre zur Altersbestimmung der Pferde, nach der Natur gezeichnet.—Schwab, C.

5. Elements of Chemistry and Dental Materia Medica.—Cassidy, J. S

6. Manuel pratique de dentistérie opératoire et notions elémentaires d'hygiene buccale et de thérapeutique dentaire à l'usage des médicins.—Nun, L.

7. Essais d'anesthésie locale en chirurgie dentaire au moyen de la tropacocaine.—Pinet Camille and Geo. Viau.

8. Les accidents de la première dentition.—Poinsot, P.

9. Formulaire pratique pour les maladies de la bouche ef des dents — Viau, G.

10. Letters from a Mother to a Mother on the Formation, Growth, and Care of Children's Teeth.—Mrs. M. W. J.

11. The Pacific Coast Dentist, a monthly periodical devoted to dental science and literature.—J. D. Hodgen.

12. Die Entwicklung und Degeneration der Hartgebilde im Tierreich in ihrer Bedeutung für die Degeneration des menschlichen Gebisses.—Fenchel, A. D.

13. Die Krankheiten der Mundhöhle, des Rachens und des Kehlkopfes.—Rosenberg, A.

14 Diseases and Injuries of the Teeth, including Pathology and Treatment —Smale, M., and J. F. Colyer.

15. Quinta dentizione in un fanciullo di dodici anni; memoria letta alla r. accademia delle scienze dell'istituto di Bologna nella sessione del 30 Aprile, 1893 —Ajutolo, Giov.

16. Des résultats éloignés de la prothèse immédiate dans les résections du maxillaire inférieur.—Martin, Claude.

17. Transactions of the Odontological Society of Great Britain. Vol. 25. New Series.

18. Notes on Anæsthetics in Dental Surgery —Underwood, Arthur S.

19. Ueber die Pathologie der Zahnpulpenpolypen.—Frank, Karl.

20. Orthodontia, ou malposition des dents humaines; moyans préventifs et curatifs; traduction du docteur G Darin.—Guilford, S. H.

21. Des injections tropacocainiques comme anesthésique local en chirurgie buccale.—Hugenschmidt, A. C.

22. Essais d'anesthésie locale, en chirurgie dentaire, au moyen de la tropacocaine, observations cliniques et experiences sur les animaux.—Pinet Camille et George Viau.

23. A Practical Treatise on Mechanical Dentistry.—Richardson, Joseph.

24. Lekzii po boljezniam penago dietskago vozrasta.—Kassowitz, Max.

25. Unfug der zahnärztlichen Pseudo-Doktoren.—Wiede, J. H.

26. De la leucoplasie buccale.—Clémenceau de la Loquerie.

27. Tooth Extraction; a Manual of the Proper Mode of Extracting Teeth. —Gorham, John.

28. Anæsthetics and their Administration; a Manual for Medical and Dental Practitioners and Students.—Hewitt, F. W.

29. Popular Essays upon the Care of the Teeth and Mouth.—Bell, Victor C.

30. Traité de l'age des Animaux domestiques d'après les dents et les productions épidermiques —Cornevin, Ch.

31. Die Extraction der Zähne für Aerzte und Studirende.—Holländer, L.

32. Cleft of the Hard and Soft Palates.—Mears, J. E.

33. Ueber Kieferbrüche und Kieferverbände.—Röse, Carl.

34. Die Extraction der Zähne für practische Aerzte und Studirende.—Scheff, Julius, Jr.

35. The Etiology of Osseous Deformities of the Head, Face, Jaws, and Teeth.—Talbot, Eugene S.

36. Contribution à l'étude de la première dentition (Evolution dentaire; ses accidents).—Mahieu, Ernest.

37. Etude critique sur les rapports entre les maladies des yeux et celles des dents.—Mathieu, A. F.

38. The Common-Sense Forceps.—How, W. Storer.

39. Repertorium der Zahnheilkunde.—De Terra, Paul.

40. De l'eclairage des cavités de la face.—Tucker, Maurice A'Court.

41. A Treatise on Pyorrhœa Alveolaris.—Cravens, Junius E.

42. Some Remarks on the Use of Anæsthetics in Dental Surgery.—Maurice, Albert.

43. Repetitorium de Zahnärztlichen Wissenschaften.—Spielvogel, K.

44. L'arte dentaria fra gli Etruschi.—Dunn, Car. G.

45. A Manual of Dental Anatomy, Human and Comparative.—Tomes, C. S.

46. Dental Anatomy and Pathology.—Bödecker, C. F. W.

47. Contribution à l'étude de la pathogénie des phlegmons péri-maxillaires d'origine dentaire.—Dumont, Louis.

48. On Alterations of the Tooth-Pulp in General Diseases of the Organism. —Kudriashoff, A. I.

49. La nouvelle législation médicale.—Lechopié, A., et Floquet.

50. Manuel juridique des médecins des dentistes et des sages femmes.— Pabon, Louis.

51. A Compend of Dental Prosthesis and Metallurgy.—Warren, George W.

52. A Practical Treatise on the Elements of Operative Dentistry.—Weeks, Thomas E.

DISCUSSION.

DR. ABBOTT: The doctor reported but one diploma mill. I don't understand where it is located; I think, however, it isn't the one I have found. There is one in Kansas City, so I understand. It is legally chartered, and in the business of selling diplomas.

DR. OTTOFY: There may be others of which we have no knowledge.

DR. ABBOTT: There is evidently a disposition on the part of all educational institutions in this country, not only to be more thorough in their work, but to extend the term of pupilage. There is a tendency in the dental profession to increase the time from three years to four. In the State of New York this subject has been considered very carefully by the educational authorities, and it has been thought the better plan to begin at the other end, and first to better prepare men for studying a profession. That is what has induced the Regents of the University of the State of New York to increase the requirements for entrance, rather than to increase the length of the course of technical instruction. Of course, there is such a thing as educating a man pretty well in our profession by putting him in an office, never allowing him to listen to a lecture or to read a book. He can learn to do practical work, to fill teeth, and to perform all practical operations. We have had the evidence of that before us for many years, because many of the older men never attended any college or had any text-books. Those times have passed, and it is thought to be much better to have our men thoroughly well prepared to receive a professional education in the first place. This was referred to in the report of the Section, and the point should be very carefully con-

sidered by the college authorities and by dental societies and associations generally.

DR. ELLIOTT: I am exceedingly pleased to hear the remarks of the last speaker. It has been my privilege to practice our profession in many parts of the world. As you know, most of the dentists practicing abroad are Americans. After a residence of eleven years in London, and having been a member of the two English societies for many years, I am sorry to come to the conclusion that the English dentists, in their general education, are decidedly ahead of us Americans. In technical skill we are probably as far ahead of them, and it seems to me Dr. Abbott strikes the nail on the head when he says that we ought to pay more attention to the preparatory education of our candidates rather than to their technical skill.

DR. MORGAN: I hadn't intended to say anything on this subject; but the presentation made by the last speaker makes it necessary, it seems to me, for some one to reply. The success of the practice of dental surgery depends upon tactical skill, and I understand he proposes to lessen the education in that direction, and to give the student theory instead of tactical skill. You may make a man the master of the entire science of medicine and dentistry, and everything collateral thereto, without even raising a suspicion that he is a competent dentist, qualified to practice.

DR. ELLIOTT: The gentleman is quite mistaken. No one would go farther than I would to secure thorough technical skill. I even favor four years' instruction, as is the custom in England; but I believe a man should have a good education before he begins the study of dentistry,—not less technical skill, but more education.

DR. ABBOTT: The possession of a thorough preliminary education before entering a dental college doesn't preclude the possibility of a student becoming a skillful practitioner. The better educated a man is before he enters upon the study of any profession, the better professional man he will of necessity make.

DR. BOGUE: In view of the remarks of the last three speakers, I may venture to call attention to the fact that in Austria a seven-years' course in medicine is required before a man can practice dentistry; and I think I am justified in saying, "Hence they have no good dentists there." It seems to me that a question which is by no means solved is, how can a man obtain the thorough preliminary education of which Dr. Abbott speaks, and at the same time obtain a high degree of technical skill, which we all know Dr. Elliott advo-

cates? The skillful pianist begins at a comparatively tender age, but he isn't expected to know Greek or Latin until his manipulation is skillful; while the dentist ought to know both, according to this theory, before he begins the practice of his craft.

DR. ABBOTT: In Italy no man can study medicine until he is a graduate of a literary college; no man can study dentistry until he has graduated in medicine. So that a man must have his degree of B.S., A.M., or A.B., and his degree of M.D., before he can take his degree of D.D.S., if they give such a degree. After so much mental training, some would say that there would be no good dentists in Italy. It seems that time does not count there as it does here. Here something must be accomplished in every moment, or else it is lost forever. On the other side of the water it doesn't seem to be so. They take five, or six, or ten years, and come out at the age of forty well prepared to practice a profession, and they think that is doing pretty well. Here a man starts in at eighteen or twenty years of age, and in three years he wishes to be through with his course, so that he can commence practice for himself; and it is right that he should, if he wants to serve his fellow-men during a fair lifetime. It is a waste of time and a waste of good material for a man to go on until he is thirty or forty years of age before serving any real purpose in the world. If our young men commence right in the first place, taking a course of study properly laid out, they can be prepared by the time they are eighteen or twenty years of age to enter college with all the literary education that is required. Then if they remain in college for three or four years, as the case may be, they come out at the age of twenty-one, twenty-two, or twenty-three, ready to earn their living in the world and render good service.

DR. CROUSE: There is just one point in the report that has not been touched upon, that I think it might be well for college men to consider. That is the question of undergraduates practicing. It is well known that a great many of the men who go through the dental schools don't continue the practice of dentistry. After graduating, many of them soon find out that they are not fitted for it; though some of them, unfortunately, don't find out that fact in a lifetime.

DR. PEIRCE: I think about one-third of the students graduated at our dental schools arrive at the conclusion that they are not fitted to practice. This is a serious loss, not only of time and money, but also of energy. Now, if there is any method by which a student can ascertain the best course for him to pursue, or the appropriate

channel for his life-work, let us by all means encourage him in that. If there was only some way by which we could sift out the chaff from the wheat, without wasting one, two, or three years, what a saving it would be, not only to the individual, but to society at large. This, in my judgment, is one of the advantages of private preceptorships.

DR. TAFT: Perhaps practicing before graduation wouldn't injure the undergraduate very much, but how about his patients? Ought they not to be considered a little?

DR. CROUSE: How about his patients immediately after his graduation?

DR. TAFT: The student is certainly different in many respects before he has completed his course, especially if the course is a thorough one. The student should be as thoroughly equipped as possible before he is permitted to operate independently. He has an opportunity, in well-regulated colleges, to operate and to treat diseases, but that is done under the direction of those who are competent to direct him. That element is lacking when he goes out to practice as an undergraduate.

DR. CROUSE: Many times he has just as competent direction.

DR. ABBOTT: Not in the same way.

DR. TAFT: In many cases not, and not to the same extent in any instance. It is, as a rule, wrong to allow the undergraduate to practice alone and unaided. If it is encouraged, in many cases these men will attain a degree of success that is satisfactory to themselves. Some people are very easily satisfied. They will attain a kind of quasi-success, and will in many cases come to the conclusion that it is not necessary to finish the college course. I think every college which intends to do the best it can for its students should give them the best possible equipment before allowing them to go out with the sanction of the college, in any sense, to practice their profession. The result of a contrary course must certainly be very prejudicial to the profession.

DR. MORGAN: I accept the explanation which has been made relative to the preliminary education which gentlemen consider necessary. The more thorough the general education of a young man is, other things being equal, the better qualified, not only to begin the study of a profession, but the better qualified he will be to serve those who put themselves under his care after graduation. But, after all, manipulative ability constitutes the keystone in the arch of qualification. Without it a man is not a dentist. He must have that.

There was another point in the report to which I wish to refer. I don't remember the exact language, but the idea was that if a young man, by any mishap or by bad advice, started upon a course that we call quackish, went into a "Cheap John" establishment, or went out upon his own responsibility to practice dentistry, that he should never be admitted into a dental college. Now, I don't believe there is any sin committed in this world which ought not to be pardoned upon repentance and reformation. If a man finds he has made a mistake, and desires to begin again in the right way, if he finds that he has been misled, why I believe that when he comes to a college and says, "I wish to register my name," he ought to be encouraged to do so. It is the best thing that can be done for the profession to get him out of the Slough of Despond. I know from observation that this is true. Some of the best men that I know in the profession began in "Cheap John" establishments, or started out on their own responsibility, not knowing that there was such a thing as a dental library in the world. So I am for taking such men by the hand, and encouraging and qualifying them as best we can.

DR. CROUSE: I want to know whether a student who comes to my office from Dr. Taft's college, or any other one, after one course of lectures, is going to do much more harm than he will after he has attended college for one more year in a room where twenty or one hundred young men are operating under one instructor. Will the patient or the student be the worse off for that?

DR. TRUMAN: There is a practical side to this question. The query arises in my own mentality, Where shall the line be drawn in primary education? I do not wish to be placed in the category of those who are opposed to a high standard of preliminary education. But I have learned by experience that in proportion to the extent of preliminary education will the technical part of a man's education be good or otherwise. That I take to be a general rule. It is impossible after a certain age to make good technical dentists. Therefore in the older countries, like Germany, where they are obliged to go through the gymnasium, as it is called, before they can enter upon any professional education, we find men have attained the age of twenty to twenty-three before they can begin. Then seven or eight years must be spent in professional study. Now, when a man reaches twenty-two or twenty-three years, he becomes defective in the ability to acquire technical manipulation, and my observation among foreign students is confirmed by Dr. Elliott, that while they are thorough in

theory they are often deficient in practical things. Now, where shall the line be drawn? I hold that the preparatory education should be sufficient to enable the student to understand thoroughly the teaching that he is to receive. It need not be equal to a gymnasium or classical course. In my own opinion, we do not require the European standard, as it does not accommodate itself to the general educational standard of the country. I mean by this the common-school system.

DR. ABBOTT: My impression is that Dr. Morgan knew what he was talking about when he said that the young man who went into a shyster institution, or into a place where they have no facilities for instruction, often *eventually* came out all right. Another point he makes is a very important one to dentists. If they are not practical men they are good for nothing. A minister must be able to preach, and a lawyer must be able to try a case. A physician isn't good for much unless he can once in a while cure a patient. It is the same with the dentist. In every country that I know anything of, excepting America, men lack that genius of manipulation with their fingers that almost every American who takes to dentistry seems to possess.

DR. BOGUE: The reason why there is a genius here, as has been said by Dr. Abbott, is because this is a republic. Every man is as good as another,—"faith, and a little better." Upon the other side of the water that is not true. There the man who labors with his hands is thereby degraded. I am to be pardoned, I hope, if I refer to my old preceptor, Amos Westcott, whose students are pretty well known throughout this country. He taught every man from the beginning. Our instruments were put into the fire, and a hammer into our hands, and every man was taught to be a mechanic first and foremost. And, as is well known, Amos Westcott was a pretty well educated man. Certainly, for two years before the studies in the college were begun, those men were taught to use their fingers. I honor his memory, and I look back with thankfulness to the instruction that was given me in matters pertaining to my every-day work. Now, if there be a school organized in this country where the equivalent of that instruction can be had, that is the school which the dentist who knows what he is doing will select for his son. If, as a result of our united wisdom, we can establish teaching of that sort, coupled with intellectual training, that will make the dentist what I believe he is, the peer of any professional man.

DR. TAFT: I understood Dr. Truman to say that he drew the line at the point in preliminary education where a man would be sufficiently educated for the study of this profession. Thus far we shall have no disagreement. But is that all that is necessary? Is it unreasonable to ask that every man who enters the dental profession should have a respectable education? More than one-half the men who were practicing dentistry twenty years ago had a very imperfect knowledge of, and little ability to use, their native tongue. Of course, I don't refer to such men as are here to-day. It is well known that many in the ranks of the profession cannot write a respectable page of composition. Is it not time that this should be remedied? And when they are tested in many of the simpler branches, how utterly they fail to make a respectable presentation.

We do not now ask for a high standard of education, but we ought to ask that a respectable, reasonable degree of culture should be possessed by every one in the dental profession. Now, the amount of general education of which I speak can be attained before the age of sixteen or seventeen, and it is not necessary to begin the technical study of the profession before that time. We find thousands of young people in our schools throughout the country, of the age mentioned, who possess all the education that even the most advanced ask for the student who is about to enter the dental school. It is within the reach of all, and it should be required of all. But it is said there are some in remote parts of the country who do not possess these advantages. Very well. That is their misfortune, and we ought not to permit the whole profession to be loaded down with opprobrium because of such exceptional cases. This requirement is so reasonable that the matter ought to regulate itself. Nobody claims that you ought to require every dental student to be a thorough Latin and Greek scholar, or that you ought to educate him in higher mathematics. There are men in our profession who are so educated, and when they write for us, or when they appear in public, they stand head and shoulders above the men who do not possess such culture.

This matter of preliminary education is one upon which there ought to be no difference of opinion among the educators of our profession. As I have said, this education can be obtained before the age of seventeen. Of course, if a man waited until he was thirty or thirty-five, it would make a great difference in his ability to acquire technical skill.

DR. MARSHALL: I agree in the main with what Dr. Taft has just

said. But I go a long step further. It does arouse my righteous indignation when I hear members of college faculties decry a liberal education as a qualification for the study of dentistry or any other profession. It seems to me that if we are to have dentists who are the equals of other professional men, they must not only have a liberal education, but they must go further than that and study medicine. Who are the writers of the text-books that you study? They are the men who have gone through our colleges, who have studied medicine, and who have then studied dentistry. It seems to me that this Association takes a step backward when it fails to advise young men to obtain a medical education as a preliminary to a dental education. It is the best qualification that a dental student can have. Dr. Taft has referred to the fact that many dentists are unable to write creditable papers, and that they are deficient in the writing of the English language. The editors of our dental journals will tell you that, as a rule, the ordinary dentist does not write a good scientific paper. Almost every such paper has to be fixed up before its publication. Now, if our profession was made up of men who had received literary and scientific educations, that would not be so. Of course, it is true that very often medical men write papers that are not worth publishing. But there are more good men practicing medicine than there are good men practicing dentistry, speaking from an educational standpoint. I believe that is true.

Some one has said that we ought to pay more attention to the practical in our dental schools and not so much to the theoretical. I hold exactly the opposite view. The only place where you can get theory into the head of a young man is while he is in college. He will not get it after he gets out. His time and attention must then be devoted to the practical, and he will and must get the practical, or else he will be a failure. Therefore I claim we are on the wrong track when we make too much of the practical in our colleges. I believe the English dentist in this respect is far superior to us, in that he has a better knowledge of the sciences which underlie dentistry than the average American dentist. Let us make good theoretical dentists first; afterward teach the practical. Theory, then practice; but not the reverse.

DR. TRUMAN: What is the good of his knowledge if he cannot do good work?

DR. MARSHALL: They send their men here to get technical knowledge. We might send some of our men over there to get

theoretical knowledge. If I were a young man to-day, I should go to England to take a course in theoretical studies, and then I would come back to my own country to get a thorough practical knowledge.

DR. TRUMAN: Dr. Taft has appealed to me to know whether the average dentist is not an ignorant man. My observation in that matter does not agree with that of the questioner. It may be true of Michigan, but it certainly is not true of the eastern States of this country. I think I have an opportunity to know, for I am brought in contact daily with the labor of dentists of the country in journalistic work. I do not find that excessive ignorance which the doctor seems to think exists, for he states that the average dentist cannot write a good paper. He refers to European dentists, and then he returns to this country and asserts we are a set of ignoramuses. I know that is not true. I know that the papers which are brought to me compare very well with those written by members of the medical profession. I am not so wholly in love with that profession as some seem to be. They have much theory. Is their practice based always on scientific methods? The practice of dentistry is founded, as a rule, on exact observation, hence its results may be relied upon for the amelioration and cure of the pathological conditions found in the oral region.

DR. TAFT: I did not say that the average dentist of to-day is an ignoramus. I said that twenty years ago or so there was a far greater lack of elementary knowledge than there ought to be. There is not so much to-day by a great deal as there was ten years ago. An improvement is being made all the while. Dr. Truman is helping to remedy that difficulty. I am glad to know, and willing to admit, that there is a larger amount of light and knowledge and intelligence and learning in the East than there is in the West. We are trying to remedy that as rapidly as we can, and we don't want anybody to throw cold water on our efforts. We want to come up equal with the East, and I hope in the course of the next century we shall be able to do so.

DR. KULP: I have always advocated the highest order of education as a preliminary step toward entering any profession, especially the profession of dentistry. The question in my mind has been how we can develop the manipulative skill while the theoretical education is being piled into the brain. Some students are taking my advice, and will take the mechanical engineering course in the University.

The requirements in that course are about as high as they are in the literary department. In addition to their literary education, they will develop the ability to know straight lines, curves, and angles, and will have acquired the use of tools. I have found such to be the most teachable of any who have been under my instruction. I believe we should require students to take such a course while preparing themselves to enter this specialty. By doing so, we should not have a lot of theorists who are deficient in manipulative skill.

DR. MOORE: It is plain that at least one-third of the students who pass through college are not competent to practice dentistry. Now, that is the fault of our colleges. There is necessarily great rivalry between the colleges, because they must live, and in order to live they must have students. There are not students enough to go around, and new colleges are springing up in every city. The practical solution of this question is to *endow* the colleges and give the professors stated salaries. When that condition is reached, then there will be intermediate examinations; and when a man is found to be incompetent, he will be dismissed, just as he would be at the military school at West Point. As has been said, it isn't right to keep a man at college for three years when it is certain that he will not be competent to practice dentistry after he goes out. That is unfair to the public and unfair to him.

DR. MCKELLOPS: The colleges have got to do something more than they have heretofore done. You may talk about the technical part. That is all right. But the student should be taught anatomy, and everything pertaining to the human system. He should be put at fine manipulation, too. When we are making dentists, start the foundation right. Then you will not see the poor results which you can find even in such cities as New York, Philadelphia, or any of the great Eastern cities. A student's ingenuity and skill should be cultivated by doing nice work. If he starts right, he will not forget what he has been taught.

DR. CATCHING: A few years ago the slaves were liberated, and we did not expect to find them entering the professions so soon. There is now a negro college located at Nashville. I am a member of an examining board, and I want to say that the negroes who come before us for examination are thoroughly up in the literary departments. If you subject them to a written examination, you will find their papers to be remarkably correct, while in their oral examinations their language and answers are equally so. In that college there

is a high standard of literary education. The progress of the negroes, considering the comparatively short time since they were liberated from slavery, is quite remarkable, and if we do not watch them and move up ourselves, it wouldn't be surprising if some of them would overstep us in the point of literary proficiency. I have been asked how they are in practice. Having been raised on a plantation with the negroes, I think I know the race very well. As a race the negro will not soon be very skillful. The highest order of technical manipulation is not to be expected of him. It is generally known on the plantations that you cannot trust a negro to manage or manipulate fine machinery, because he cannot comprehend it. But my object in speaking of him was to tell you what remarkable progress the negroes have made in literary education.

There is one thing which I have never heard mentioned at these meetings, and that is the social standing of members of the dental profession as such. Within the memory of comparatively young men the dentist had no social status at all, occupying about the same position that the chiropodist does to-day. That was largely due to the lack of literary education. As the dentist rises in literary attainments, he is elevated in the social scale, and so to-day many occupy responsible positions, and it will not be long before the dentists will be looked upon as educated men. When the public recognizes dentistry as a learned profession, there will be nothing more to be desired in that direction.

DR. OTTOFY: Dr. Abbott stated that in Europe educational methods are slow. He said that a man would be forty years old before he could enter the practice of dentistry.

DR. ABBOTT: No, I did not make that statement.

DR. OTTOFY: Well, the idea was that a man is pretty old before he gets to practicing.

DR. ABBOTT: Yes.

DR. OTTOFY: The most expensive degree, so far as time is concerned, that a man can take in course, is the degree of Doctor of Medicine in Sweden and Norway, and that takes nine years; but the student is permitted to take the primary branches in such a manner that he can finish the course before he is twenty-five years old, and there is not a degree to be earned in course anywhere that cannot be obtained by a man of that age.

The University of Chicago has drawn from the entire world its professors. It has brought men over from Japan, India, and every

civilized country of Europe, yet the majority of the professors in that university are young men, many of them younger than I am, and many of them occupied professorships in universities all over the world before they were thirty-five years of age.

In regard to the propriety and advisability of asking incompetents to leave college before their course is completed, that is done in some colleges. It is true that it is not justice to a student to let him go on for two or three years if the faculty is aware that he can never make a successful dentist. I know that in some colleges such men have been advised to leave.

Relative to permitting undergraduates to engage in the practice of dentistry, I do not know how that operates in other States, but in Illinois it is managed badly. Prior to the time when Dr. Harlan was appointed on the Board of Examiners last spring, the practice was such that any one who came before the Board and passed his examination was admitted to practice. The questions are published and obtainable in advance; any one can read them, and any bright boy can read up on them and answer them. As a result, at least two men from the American College of Dental Surgery who entered the freshman course last fall received temporary licenses to practice in the State of Illinois this spring, and they are practicing. A number of juniors have also received licenses. Whenever it has been brought to our knowledge that an undergraduate was practicing illegally, we at once reported the case to the State Board.

My distinguished friend from Tennessee, Dr. Morgan, did not quite understand what I said in regard to the admission of men who do not live up to the requirements of the Code of Ethics. What the Section recommended was that no one should be permitted to matriculate unless he has for two years prior to matriculation shown due respect to the profession by observing its Code of Ethics. That is an easy matter to do. In a short time it would become as well known as it is to-day that it requires three years of study. If a young man comes to a college now, he generally has already found out that he will have to study for three years. That it is necessary to live in compliance with State laws, and with the laws governing professional men, would soon be generally understood.

My friend, Dr. Marshall, referred to the education of dentists first as medical men. I do not wish to re-open the question whether dentistry is a specialty of medicine; but I am in the habit of reading medical journals, and I note the tendency in the medical profession

to-day is to do exactly what dentists are doing, and that is to educate physicians as specialists. It is acknowledged by high medical authorities that it is utterly useless for the ophthalmologist (as an instance) to be educated as he is being educated to-day; that it is a waste of time. Now, if it is a waste of time for the ophthalmologist to take the entire course in medicine, it certainly must be equally so for the dentist.

The Section desires to apologize to Dr. Crawford for an error for which it is really not responsible. Dr. Crawford wrote a paper on dental education, and turned it over to the Committee on Voluntary Essays. It was not handed to me until after I had read my report. The doctor thinks that almost everything in the paper has been discussed in connection with the report, and that therefore it would seem superfluous to read the paper.

SECTION II.—Continued.

Dental Nomenclature.

REPORT BY S. H. GUILFORD, SECRETARY OF THE SECTION.

THE subject of dental nomenclature has never as yet received the attention which its importance demands. While we claim for our profession that it combines the principles of both a science and an art, we are still lacking in that most essential requisite of a science, exactness of expression. The whole literature of dentistry teems with examples of words used interchangeably, which in many cases vary greatly in their shade of meaning, while others not infrequently fail to convey the meaning intended. We do not find this to be so in any of the other sciences. In the so-called exact sciences, mathematics, chemistry, and astronomy, as well as in the less exact ones, engineering, navigation, physics, and others, each part, factor, manifestation, or act has its single and appropriate designation. Were this not so, confusion would surely result, and sometimes disaster. In our haste and anxiety to further the material interests of our profession we have in large measure overlooked the character of the foundation upon which we have been building. We can never lay claim to being scientific until we have a vocabulary suited to our needs, and which will enable us to express our ideas correctly and without danger of misunderstanding or confusion.

Reports upon this subject, more or less satisfactory, have been presented before societies from time to time, the most elaborate one being that presented to the Columbian Dental Congress a year ago.

In addition to these reports, individual members of the profession have in some instances devised a nomenclature of their own and offered it for adoption, and if the originator happened to be a member

of a college faculty his system has usually been adopted and taught in the school to which he belonged.

As each system proposed differed in many respects from any other, and as each one also embodied certain individual peculiarities that lessened its value in the estimation of the profession generally, all of these efforts, instead of simplifying and systematizing our terminology, have, on the contrary, added to the confusion. In view of these facts and the unquestioned importance of the subject, your Section is of the opinion that some steps should at once be taken by this Association to have prepared an intelligible, correct, and systematic nomenclature, which by its inherent merits will commend itself to the profession in general, and be adopted by them.

Your Section believes that this end can best be attained by the appointment of a special committee, large enough to include one or more members especially interested in each of the departments of our profession, whose duty it shall be to carefully and studiously prepare a terminology that shall be accurate and at the same time simple enough to be readily comprehended.

The duties of such a committee, if properly performed, would be onerous and long-continued, but the benefit resulting would be almost incalculable.

Your Section would also suggest the formal adoption by this Association of the system of dental notation devised by Dr. Corydon Palmer some years ago, consisting of the use of the Arabic numerals to indicate the permanent teeth, and the Roman numerals to designate those of the deciduous set, with vertical and horizontal lines to specify the arch in which they are situated and the side of the median line where they belong.

SECTION II.—Continued.

An Etiological Classification of Pyorrhea Alveolaris.

PAPER BY M. L. RHEIN, OF THE SECTION.

THE various forms of pericemental inflammation, with their purulent discharges at the gingivæ and the subsequent loss of tissue, have been among the questions most disputed in discussion for some years. The etiology, pathology, and treatment of this disorder will continue to furnish fields for "battles royal" at our meetings until science succeeds in vanquishing this destroyer of the dental organs.

Too much valuable time has been consumed in discussing the various names that have been given to these conditions by different men. For years this disease was known by the name "Riggs's disease," in deference to the man who first called public attention to the feasibility of combating its ravages.

In 1877, at a meeting of this Association, the name of "pyorrhea alveolaris" was first introduced by the late Dr. Rehwinkel.* After seventeen years of discussion, notwithstanding the objections of some of our ablest men, this name has secured a firmer foothold than ever. You might as well endeavor to eliminate dyspepsia from the nomenclature of general medicine as attempt to abandon the use of the term pyorrhea alveolaris.

The name expresses clearly the clinical feature of a flow of pus from the alveolus at its gingival border. It has, however, been used indiscriminately by different men for every form of this disease, simple or severe, and has thus led, especially in discussion, to great difficulty in understanding what particular form of pyorrhea might be intended by different men.

*The name was used in France previous to that date.

Obviate this difficulty, and one source of contention is removed, and we can then devote ourselves to the more important fields of investigation and results, without having our time wasted by continued objections to the various proposed names, the discussion of which has so often resulted in drawing away our attention from the more important features of the subject.

With this object in view, I submit for your consideration the following plan of nomenclature.

Retain the name pyorrhea alveolaris as generally descriptive of any condition where there exists a flow of pus from the gingival border of the alveolus, and classify the different forms. A large number of practitioners still cling to the idea that all forms of this trouble are purely local in their origin, and that a permanent cure can be effected by local means. There is no question that lack of hygienic conditions, with all their attendant unsanitary surroundings, is at times the sole cause for very severe purulent discharges from the alveoli. This condition, which is purely local in origin and requires only local treatment, must be sharply divided from those serious cases where malnutrition and poverty of life-endowing corpuscles play so important a rôle.

Consequently we make two grand divisions :

I. *Pyorrhea Simplex*,—embracing all cases of purely local origin and requiring only local treatment.

II. *Pyorrhea Complex*,—embracing that larger field of more serious disorders and graver affections. These cases are often spoken of as "true pyorrhea" by some authors, "phagedenic pericementitis" by others, and the very latest addition to our category is "hematogenic calcic pericementitis." All these names have been coined because of the observation of certain peculiar clinical features about the alveoli, ignoring entirely the primary cause in this nutritional disorder.

The plan I have the honor to suggest for your consideration embraces the addition of a modifying word to all forms of pyorrhea alveolaris of the complex variety, this modifying word to be indicative of the etiology of the case in question after a satisfactory diagnosis has been made.

Under *Pyorrhea Complex* we make the following subdivisions :

A. Those due to nutritional disorders, among which may be especially mentioned : 1, gout ; 2, diabetes ; 3, chronic rheumatism ; 4, Bright's disease ; 5, scurvy 6, chlorosis ; 7, anemia ; 8, leukemia ; 9, pregnancy.

B. Those occurring during attacks of acute disease, such as acute

infective diseases; among these may be mentioned: 1, typhoid fever; 2, tuberculosis; 3, malaria; 4, acute rheumatism; 5, pleurisy; 6, pericarditis; 7, syphilis.

C. Those that are due to nervous disorders; among these we might specify: 1, cerebral diseases; 2, spinal diseases; 3, neurasthenia; 4, hysteria.

D. Those conditions resultant from the toxic effect of certain drugs, such as: 1, mercury; 2, lead; 3, iodine.

E. Called *Pyorrhea Sequentia*, a condition of diseased pericemental tissue left behind after the primary cause has been cured.

With such a classification as this borne in mind, when a man speaks of "gouty pyorrhea," or "mercurial pyorrhea," or "tubercular pyorrhea," he is at once clearly understood.

The pathology and treatment can then be discussed in a rational manner without the injection of entirely irrelevant matters.

DISCUSSION.

DR. TRUMAN: I want simply to make a correction of Dr. Rhein's paper. As I understand him, he gives credit to Dr. Rehwinkel for the introduction of the term "pyorrhea alveolaris." It was used by the French writers long before that. I have seen the same statement made elsewhere. I think it should be corrected here.

DR. HARLAN: The expression "pyorrhea alveolaris" occurs in the first edition of Wedl's "Dental Pathology," which was published as early as 1868 or 1869, and was translated from the German by W. E. Boardman, of Boston, and the late Dr. Hitchcock, of Harvard University. The use of the expression before that time I am not able to give you.

DR. RHEIN: I am very glad the correction has been made at this time, and I should like to have the Secretary make the necessary correction in my paper. I trust that the idea which induced me to present this paper will not be allowed to go unnoticed; which was to get an expression of the sentiments of the members of this Association as to the possibility of adopting such a nomenclature as I recommend, based as it is on true etiological principles, and modeled on nomenclatures adopted by other specialists in other branches of the healing art.

SECTION VI.

ETIOLOGY AND PHYSIOLOGY.

REPORT BY H. A. SMITH, CHAIRMAN OF THE SECTION.

THE Section on Etiology and Physiology begs leave to offer the following as its annual report. Papers will be read: "Etiology of Dental Caries," by Dr. Stewart B. Palmer, of Syracuse, N. Y.; "Final Report of the Examination of Human Crania in the Museums of the United States," by John J. R. Patrick, of Belleville, Ill. (read by title).

In the January number of the *International Dental Journal* a paper was published on the "Etiology of Pyorrhea Alveolaris," by Professor C. N. Peirce, a member of this body.

This paper has attracted wide attention, and has been reviewed by some of the ablest men in the profession.

The author, after stating that it is only through study of the pathology of any complex morbid condition that we are able to give a proper classification of any disease, criticises the name pyorrhea alveolaris, since it "refers only to one symptom and is therefore provisional and more or less objectionable." From a study of the abnormal alveolo-cemental membrane, he recognizes two closely allied but yet different pathological states; different in their etiology, in their clinical history, in their symptomatology, and in their susceptibility to treatment. For the purpose of clearness and the ready differentiation of the varieties of calcic pericementitis, Professor Peirce introduces two new terms: ptyalogenic calcic pericementitis, and hematogenic calcic pericementitis. The first is intended to express the idea that the disease is in its origin local, peripheral, and salivary; the second, that the disease is constitutional, central,

and associated with some abnormal quality of the blood. The contention of Professor Peirce is that in the disease familiarly known as pyorrhea alveolaris the morbid process begins on the root of the tooth, usually in the vicinity of the apical extremity, and in marked contrast to the ptyalogenic form, which has its origin at the gingival border; and that the active cause of the inflammation leading to formation of pus is the deposition upon the cementum and in the meshes of the alveolo-cemental membrane of an insoluble salt.

With the view of ascertaining the composition of this concretion, and also if it differed materially from salivary tartar, Professor Peirce removed the so-called sanguinary tartar from a number of teeth lost from pyorrhea alveolaris, and subjected them to chemical analysis. In each instance the result showed that the deposit was composed of calcic urate, with traces of calcic carbonate and phosphate, quite in contrast to salivary calculus, which contains sixty-eight per cent. of calcium phosphate.

The existence of the urates, in which uric acid is the larger element, shows that these deposits which are found high up on the roots of the teeth are a precipitate from the blood-exudation, that the irritation is of constitutional origin, and that the disease pyorrhea alveolaris is but another phase of the uric-acid or gouty diathesis.

It has been ascertained that the blood of gouty patients contains an excess of one-tenth of a grain of uric acid in one thousand grains of blood-plasma. Uric acid not being diffusible, it is imperfectly eliminated from the blood by the kidneys. In consequence, it accumulates and enters into combination with sodium and calcium, forming urates.

In this diathesis the uric-acid salts are eliminated from the blood through the capillaries, passing out associated with the lymph. With the absorption of the excess of lymph by the lymphatics, the residual salts are precipitated upon the cemental surface, and, in some instances, into the pericemental membrane. It is not difficult to see why the deposit should be found upon the cementum and in the substance of the surrounding membrane, if we recall that the current of the lymph-stream is largely directed toward the cementum and into its lacunæ and canaliculi, and when reversed toward and into the alveolo-cemental membrane.

The constant deposition and consequent pressure of these insoluble salts cause irritation, which leads up to the suppurative stage in inflammation. These changes taking place upon the cemental aspect

of the membrane, lead to its detachment from the cementum and the development of a pus-pocket.

The essayist explains the disappearance of the alveolar process in this wise: In pericementitis the effusion exerts a pressure in both directions, toward the cementum and toward the alveolar process. This pressure, interfering with the nutrition of the process, leads to softening and absorption. But for the fact that as the pus accumulates the pressure rises, thus causing the fluid to burrow toward the gum-margins, strangulation of the tissues would occur and necrosis of the alveolus would result. Professor Peirce, in concluding his paper, says, "In presenting this paper with the statements embraced therein, which I have endeavored to demonstrate, I hope it will open a broader field for investigation, which will in the near future or eventually lead to a more intelligent and united judgment upon the etiology of pyorrhea alveolaris, which certainly at the present time is so unsatisfactory."

A wish to which, no doubt, a hearty response will be given by every member of this Association.

In the July number of the *Dental Review* a paper was published with the title "Diseases of the Peridental Membrane, and the Uric-Acid Diathesis," by Professor G. V. Black, of Illinois.

This paper is in the nature of a review of the paper of Professor Peirce, to which I have directed your attention.

The author of the paper reiterates his belief that the disease phagedenic pericementitis, which is another name for pyorrhea alveolaris, has its beginning at the gingival border. In this belief he differs from Professor Peirce, who holds that true pyorrhea alveolaris always begins upon the root of the tooth away from the gingival border. He then asserts that Professor Peirce has given the description of a new form of disease not before known to the profession, and that the discoverer should have proposed a new name for it. He thinks Professor Peirce unfortunate in his nomenclature, that his "hematogenic calcic" is only the equivalent of serumal calcic, which is now commonly used to designate a certain form of calculus found under the gum-margins.

If we concede that Professor Peirce's views regarding the etiology and pathology of the varieties of calcic pericementitis are correct, then the adoption of the terms he proposes will greatly aid in giving expression as to their true nature and as well in their differentiation.

Professor Black's paper is especially valuable in that it records a series of tests made to ascertain the presence of uric acid in oral calculus. Fifty-one specimens of calculus, eleven of which were of the serumal variety, were subjected to the murexide test, and with few exceptions uric acid was found. In the serumal specimens the larger proportion of uric acid was present, and the results obtained corresponded closely to those published by Professor Peirce. The specimens were obtained from patients regardless of condition of health, though none, he states, were afflicted with gout. No greater amount of uric acid was shown in those patients with phagedenic pericementitis than in those without the disease. The exhibition which he was able to make of the appearance of uric acid in the concretions of the human mouth leads Professor Black to say, "The significance of the appearances reported by Professor Peirce is reduced to zero;" and that in his opinion "the appearance or non-appearance of uric acid in calculus on the roots of teeth or elsewhere in the mouth is of no value in the diagnosis of the uric-acid dyscrasia."

Again, Professor Black makes the point that gout is eminently a non-suppurative disease, while pyorrhea alveolaris is eminently suppurative. The name itself indicates this prominent characteristic of the disease of the peridental membrane. Continuing, he says, "Considered as a joint, the attachment of a tooth has little in common with other joints. It has none of the cartilages which are the favorite seat of gouty deposits. Furthermore, it has a large supply of glandular tissue. These glands are now recognized as true epithelial tubular glands, pouring their secretions into the gingival space about the necks of the teeth. In phagedenic pericementitis they appear to be the true seat of disease. The formation of pockets extending deeply into the substance of the membrane is but the expression of the suppuration of these glands, the course of which is followed.

Regarding the participation of bacteria in pyorrhea alveolaris, Professor Black says, "It seems probable that this disease is the result of the growth of a strictly parasitic fungus, which we are unable to study by our present means of research."

In concluding his paper, Professor Black says, "While there is much in the character, mode of progress, and general surroundings of this disease that naturally gives rise to the supposition that it is constitutional in its origin, or dependent upon some general dyscrasia, a closer review of all the facts known to us give a strong balance in favor of the idea that it is purely a local affection of an infectious

character, that has a relation to a particular tissue, the glands of the peridental membrane."

Dr. Junius E. Cravens has recently published a "Treatise on Pyorrhea Alveolaris."

The author in the introduction states, "The etiology of this disease still is unsatisfactorily explained; its pathology is erroneously written and diagnosis hopelessly ambiguous," and then proceeds to say, "Whatever may be the apparent cause of a given case of pyorrhea alveolaris, it must be admitted that the formation of calcareous matter in crusts about the necks of teeth is conducive to the establishment of that disease."

Though evidently regarding pyorrhea alveolaris as beginning at the gingival border, Dr. Cravens admits that affections of the kidneys, bladder, or lungs are operative in a degree, as shown frequently by extraordinary tendency to calcareous deposition upon teeth of certain subjects, or by a marked inconstancy of the gum about the necks of some or all the teeth. Either of these manifestations, he thinks, would indicate organic disturbance extending far back of any local conditions, and depending upon constitutional obliquity that may be hereditary or acquired.

Referring to "invisible calculus," he says, "There is no point in the study of pyorrhea alveolaris upon which there exists greater diversity of opinion than as to the character and origin of the calculus found so tenaciously adhering to roots of teeth in pus-pockets."

It is the author's belief that the source of the peculiar elements of the deeper pocket calculus is to be found in the pus itself; that it should be called pyonal calculus. The mass is thus composed of a combination of pyonal calculus and salivary calculus.

He gives the proportion of lime-salts found both in pus and in human saliva, and then says, "From the analysis given, it is evident that the proportion of lime-salts in pus is far in excess of that of saliva at any point of production, singly or mixed." With these facts in view it should be a matter of surprise that the deposition of calculus within these pockets continues so small.

This is the first statement we have had of a belief that the concretions found on roots of teeth in this disease are in part a precipitate from pus. Professor Peirce believes the concretion is the irritant causing inflammation; Dr. Cravens that in the deeper pockets it is the result of inflammation, which, beginning at the gingival border,

progresses toward the apex of the root, pus-pockets being formed any place within the socket of the tooth where the inflammation has reached the suppurative stage. Dr. Cravens is quite positive there are no so-called blind pockets; that for every one there is a means for ingress from the gingival line, as well as a necessary means of drainage at that line. "The dental surgeon," he states, "may not be able to discover an opening to a pocket with such appliances as usually are at hand, but it is there, nevertheless, and it ought to be discovered."

The composite character of the calculus of pyorrhea alveolaris is proof that the oral secretions have ingress to any pocket, whether open or blind. The other elements in the calculus, that cannot be accounted for orally, the author, as already stated, believes are derived from pus.

Such, in brief, are the views of the author of this little volume regarding the etiology of pyorrhea alveolaris, based, as he states, upon observation and study of the disease for a period of twenty years. The results of this study lead the author to assert that his is a system for the prompt, positive, and permanent cure of pyorrhea alveolaris.

A work has been recently issued, "The Etiology of Osseous Deformities of the Head, Face, Jaws, and Teeth," by Eugene S. Talbot, M.D., D.D.S.

This is stated to be the third edition, but as compared with his former books it is practically a new work. It now contains thirty-nine chapters. Some of the newer subjects treated are: Development Neuroses, Crime, Prostitution and Sexual Degeneracy, Inebriety, Genius, Consanguinity of Parents, City *versus* Country Life, and Constitutional Lesions.

These and various other influences which are brought to bear on man and which result in neuroses of degeneracy, in excessive and arrested development of the osseous system, are fully discussed in the book. In large measure the deformities which come under the observation of the dentist are attributed to neurosis by the author. A neurotic is defined as one whose brain and nervous system are unstable from acquired taint, or often from inherited tendencies. As the nervous system controls nutrition in all departments of the organism, we would naturally look for anomalies with erratic nervous functions in these individuals. This is often shown in a defective devel-

opment of the bony structures. Neurotics have fine and delicate features, small jaws, and defective teeth. The arthritic diathesis is associated with neurotic manifestations, and is responsible for many acquired bony deformities, frequently involving the jaws.

The author calls attention to a singular fact. There seems to be a tendency for neurotic people to seek each other's society. This sympathy which neurotics have for each other often results in marriage. Such marriages are great factors in the production of a class of persons who are deficient not only in their mental stability, but also in their osseous system.

Irregularities of the teeth are classified into constitutional and local. The constitutional varieties involve the jaw-bone, develop with the osseous system, and are stigmata of degeneracy. The local irregularities, involving one, two, or three teeth, are due to local causes, as improper eruption or injudicious extraction of the temporary teeth. They should not be considered in a diagnosis in connection with neuroses or degeneracy.

Although this work is dedicated by the author to his fellows in the medical profession, it will prove interesting and profitable reading to our profession, and especially so to those who are giving attention to what is sometimes called corrective dentistry.

DISCUSSION.

DR. PEIRCE: A word regarding Dr. Rhein's paper. I think he has stated his views in a clear, practical manner. His effort to differentiate the various conditions which have been grouped under the head of pyorrhea is timely. In the little work that I have done upon the subject, my great difficulty has been that, though conditions varied exceedingly, yet they have all had the same terminology. Many are amenable to local treatment, while in others it is impossible to effect even a modification of the progress of the disease by topical applications. So that in the papers I have prepared on the subject of pyorrhea I have stated that the first condition was to properly differentiate. I believe that what I term true pyorrhea has a constitutional origin, that it begins at or near the apical end of the root, attended by an effusion, and that with that infiltration of the tissues a deposition on the end of the root usually results; that following this a pocket is established, secondarily and not primarily, as has been believed and stated. That was my position.

In the criticism which my friend Dr. Black has offered in his very able paper, he states that he does not recognize this condition which I have described, with a deposition upon the root which Dr. Ingersoll has designated "serumal" deposit. Dr. Black states that he has not seen such cases. That is where I think he is deficient in his observation and his diagnosis. He states again that ordinarily gouty conditions are not attended by suppuration. If he had read carefully the last work issued by the ablest author on gouty conditions, Dr. Dyce Duckworth, he would have seen that that author gives numerous cases where such a condition accompanies these deposits; and, as the tissues about the root of the tooth are such as to invite this condition, we frequently have it.

DR. ABBOTT: I agree with Dr. Black in reference to this matter. I have never yet seen the condition that Dr. Peirce speaks of, where a deposit has occurred first at the end of the root, producing suppuration. I cannot conceive of a condition of that kind which would not result in a terrific abscess to start with. I believe that the disease is due to both local and constitutional causes; that it is a manifestation of a constitutional disturbance localized in the mouth. I have taken the position, and I hardly think it can be controverted, that no true case of pyorrhea alveolaris ever occurred where ptyalism had not first been produced. There is originally some local disturbance at the margin of the gum which cuts off its nourishment, causing it to detach itself from the necks of the teeth, and the result is a pocket or sac, which furnishes a lodgment for particles of food. These remain around the necks of the teeth and become a matrix into which are infiltrated lime-salts. We may say ptyalism (mercurial poisoning) is a constitutional disturbance, brought about by the action of mercury. Where tartar collects upon the teeth in large quantities, I think it is due to a lack of proper assimilation of food. If every organ in the body performs its function perfectly, large quantities of lime-salts cannot collect in the mouth or anywhere else.

So far as the nomenclature of this subject is concerned, I think there is altogether too much talk and fuss over the principles which we should understand before we attempt a change. If there is anything which will befog us in relation to disease, it is to accumulate and multiply names in reference to apparently the same conditions.

DR. GUILFORD: I should like to ask Dr. Abbott whether he believes that the first manifestations of pyorrhea are always at the gum-line.

DR. ABBOTT: I do, most emphatically.

DR. CRAWFORD: I undertake to say that the condition known as pyorrhea alveolaris will never occur in any case without the precedent condition of an issue. That truth is sustained by the fact that in all cases, whether the affection be the local manifestation of a constitutional disease, or whether it be an affection that depends upon local conditions alone, after the teeth are all removed you never see any more of pyorrhea alveolaris. Neither do I believe that any accumulation upon the roots of the teeth below their necks, known as serumal calculus or other forms of calculus, ever takes place without the precedent condition of an issue. Now, I am not better satisfied of any one pathological fact than I am of this just stated.

I agree with Dr. Abbott in reference to the terminology which we should use. I believe in sticking to the medical nomenclature, and in enlarging it in accordance with the laws of philology, to an extent which will enable us definitely to express the truth upon any given question.

I was very much pleased with Dr. Rhein's paper. If he had said simple pyorrhea, instead of "pyorrhea simplex," I should have been still better pleased. His last expression, "pyorrhea sequentia," could hardly be made more brief and simple. I congratulate the gentleman upon the exceeding ingenuity with which he arranged the manner of expressing the pathological conditions under consideration.

DR. ABBOTT: I should like to have Dr. Crawford explain what he means by saying that such conditions never occur without "the precedent condition of an issue."

DR. CRAWFORD: An issue, such as a wound upon the surface, an opening at such points, by and through which infection can take place, whether this is a pin puncture, or whether it is an erosion of large size. I mean an issue, an opening. That is the reason why mercurial salivation manifests itself more particularly in these tissues, because the local condition is favorable to its manifestation at that point. I believe there are other tissues in the body that would respond under like circumstances.

DR. RHEIN: The discussion that has taken place this morning, and an observation of the discussions on this subject for the past twelve years, lead me to believe more firmly than ever in the correctness of the views I expressed in the few words I made use of last evening. It is a well-known fact that men of well-established authority and with well-developed powers of observation confront one

another, year after year, with opposing views, representing that they observe varying clinical conditions of affairs in watching the work of this destroyer of pericemental tissue. Now, I for one am opposed to the view which is continually taken by some gentlemen,—viz, "that the other man has observed something incorrectly," but am more inclined to believe that he has had the opportunity to observe something that I either have not been careful enough to observe, or that has perhaps not come under my observation, owing to locality or other conditions. I am, however, quite positive in my own mind of the correctness of the clinical facts as stated by Dr. Peirce,—that cases of this disease do occur without any perceptible breaking of the gingival border. In the very able paper in this month's *Review*, by Dr. Black, he admits the possibility of such occurrences.

The report of the chairman of this Section quotes from a recent work of Dr. Cravens, in which the author suggests that these deposits found in the pericemental tissues are derived from the pus. This may strike some as rather novel, but it is directly in the line of some of the clinical features observed by some of our best scientific men in their investigations as to uric-acid deposits throughout the body generally. The present preponderance of opinion tends to the belief that these deposits are the result of the retrograde metamorphosis of the nuclein, which retrograde change results in various chemical products before reaching that of uric acid. This would account, clinically, for the fact that we do not always find serumal deposits. There are chemical changes preceding the deposits. Now, supposing the action ends there, we certainly could not expect to find any deposit of the urates.

I make this statement for the purpose of placing before this body the results of recent pathological investigations by well-known observers; not that they are positively held, or proven, but that they seem to have the preponderance of weight in their favor, and I lay them before you to invite your careful consideration.

It has been repeatedly said, "Extract the teeth, and that is the end of pyorrhea." Now, why is it that the extraction of the teeth ends the pyorrhea? The fact is that pyorrhea is frequently the sole symptom in people who are commencing to show signs of some such affection as diabetes, gout, or Bright's disease, etc. Why is it that we find that they have trouble about the mucous membrane of the mouth before any of the other tissues are involved? The solution of this question was made clear to me by a fact which the late Dr. Atkinson stated, that there was no other tissue of the body that was

so near the original protoplasm in its form as the mucous membrane about the teeth, and, consequently, the sockets which hold the roots have that form of tissue to a great extent. It differs from all other joints and sockets, as Dr. Black has remarked in this month's number of the *Review*, by being totally deficient in cartilage. It is one of the softest, most vulnerable tissues of the body. That alone is sufficient to account for its extreme susceptibility to a lack of sufficient nourishment and consequent retrograde change back to its primeval order.

DR. MARSHALL: Three or four years ago I had the honor of reading a paper before the Section in the American Medical Association, at Washington, entitled "The Gouty and Rheumatic Diathesis as Manifested in the Peridental Membrane." In that paper I took the ground that Dr. Ingersoll was not correct in his theory that serumal calculus was the result of inflammation. I claimed that it was one of the manifestations of gout, a uric-acid deposit, these conditions being found at the apices of the roots; that in those cases we frequently found no connection between the suppuration which occurred at that point and the gum-margin. Now I say positively, gentlemen, with the utmost care—and I do not think I am a slovenly man with my work, I do not think I am a careless observer—I have found no external opening until I made it with a bistoury. I have made the most careful search around the necks of the teeth, using fine steel probes, sometimes spending an hour in trying to find an external opening to the abscess,—I don't say in all cases, but in a great many cases. I also suggested in that paper—and if I am not mistaken I was the first to suggest it—that these deposits found in these particular cases will be found to be made up of urates of lime and soda. Dr. Peirce has since taken up this matter, and I think he has pretty thoroughly demonstrated that that suggestion was correct.

Dr. Black has also gone over the same ground again, and I think from my reading of his article that he has proved our position. In almost every case where the serumal calculus was found, it gave the reaction for uric acid. But he also found in the salivary calculus, in a great many cases, the same reaction, and so he concludes, if I understand him correctly, that because he found it in the salivary calculus, therefore the argument didn't hold good that it was caused by a rheumatic or a gouty diathesis. Now, I don't think that argument will stand. In fact, I believe it proves our position.

Then one other criticism which I would make upon his work is

this, that in no case in all these examinations did he test the urine or the blood to see whether the uric-acid diathesis was present. He says there was no history of gout. I said in my paper, already referred to, that many times the only clinical evidence we have of the gouty diathesis in the individual is this condition of the teeth. You will find it so in rheumatism. One of the first and earliest symptoms of acute rheumatism is soreness of the teeth, an inflammatory condition of the peridental membrane, and later it affects the joints. Why is that? The peridental membrane is a fibrous tissue. We know that uric-acid deposits have a tendency to or a predilection for the fibrous tissue around the joints, and I maintain also for the peridental membrane; and it seems to me, gentlemen, that the method of treatment which I have followed proves also that many of these cases were caused by the gouty diathesis. For instance, I say to a patient, "I want you to stop eating meat, and I do not want you to drink any wine, ale, or fermented liquors of any kind. Drink whiskey as the least injurious, if you must have a stimulant." I put him on lithia or distilled water,—and, by the way, I like the distilled water better than I do the lithia water. I have had patients under this treatment for two years, and when they exclude largely every form of meat diet, and, in fact, all albuminoids as far as possible, and confine themselves to lithia or distilled water, they don't have such frequent exacerbations of the disease. When they stop this treatment, it comes on again. I have one patient who comes to me frequently, a case of this kind. I say to him, "Were you at a banquet the other night?" "Well, a week ago I was out. I ate some game, and I drank a bottle of champagne with the boys." And I say to him, "Now you are suffering for it." His reply the other day was, "Well, I begin to think so;" and he said that several times when he had done this he had noticed these exacerbations of the trouble. When he lets these things alone and goes on with the line of treatment I have indicated, he is comparatively free. I could give you a number of such instances in which the results of treatment demonstrate that in these cases the trouble is caused by an excess of uric acid in the system.

I was much pleased with Dr. Rhein's paper, though he left out, probably inadvertently, one cause of pyorrhea, to which I called attention when the Association met at Minneapolis. That cause is displacement of the uterus. I then reported three or four cases which, without doubt, were the result of neurasthenic conditions brought

about by displacements of the uterus. When the uterine troubles were corrected, the pyorrhea passed away without any other local treatment than a thorough cleansing of the mouth.

We cannot say positively that pyorrhea alveolaris is caused by local conditions. I believe that a great many cases do arise from local causes, from uncleanliness, and from salivary calculus. But I believe many come from systemic conditions like gout, rheumatism, displacements, neurasthenia, anemia, etc.

DR. CROUSE: I did not suppose observers would disagree as to whether there was a deposit about the ends of the roots of the teeth before there was a break of the tissue and a discharge of pus. The proof that my diagnosis and observation of a number of cases was correct was furnished on extracting the teeth, when I found a small deposit upon the ends of the roots, with no destruction or disturbance of the tissue anywhere else on the root. In one case the deposit was on the root of an upper molar, without any disturbance of the other roots of the same tooth. I have been seeing these cases now and then for several years; not frequently, but more frequently than I want to, because I believe that that form of trouble is incurable unless nature removes it by absorption. I want to raise that question, whether that deposit, when formed, is ever absorbed, or carried off by nature. I could relate ten or twelve instances in the last twenty years in which I could have convinced the most stubborn unbeliever, if he had been with me, that such a thing does occur as a deposit at the end of the root without the breaking of the tissues, and without any pus-sac, the pus-sac following afterward. These cases will occur, and the peridental inflammation will express itself by the elongating of the teeth. I have ground some of these teeth down to relieve the patient; but now, when it is absolutely settled in my mind that this condition exists, I extract such teeth. That is the only treatment I know of, unless I can be convinced by the pathologists that this deposit is removed by absorption. I have had cases where I suspected that this was going on, where the tooth became quiet, either from the deposit being tolerated, or absorbed. Who knows? You cannot get down there to see.

This disease, I think, is the most destructive of all dental troubles. Pyorrhea in this form, in my opinion, is incurable.

DR. NOBLE: I have been intensely interested in the articles by Dr. Peirce and Dr. Black which have appeared in our journals. I have changed my opinion within the past two years, and now from

observation in two or three cases in my own practice, which I have studied very carefully, I have come to believe in the position taken by Professor Peirce and Drs. Marshall and Crouse. Cases do undoubtedly occur in persons with the gouty diathesis where the deposit will take place near the end of the root of the tooth without any opening at the margin of the gum. In the majority of cases the pyorrhea alveolaris undoubtedly occurs from the little pockets or issues, as Dr. Crawford says.

DR. MORGAN: I have not much to say upon this subject, because I have not much positive information. I have been extracting teeth for a good while. I have never yet met with a case of deposit upon the end of the root without there was an opening to it, either along through the alveoli or through the canal of the root. I would repudiate the idea that when that calculus is once formed it is ever absorbed. There is no case recorded in the history of surgery, so far as I know, where a calculus, in any part of the system, was ever broken down and absorbed. You know we meet with such deposits sometimes in soft tissues that wander about, but they are not absorbed. I know a man who carried one in his leg, which was sometimes above the knee, and sometimes below, in the calf of the leg, but it remained there all his life. It was supposed to be a calculus. Nobody ever saw it, but it was a hard substance that wandered about, sometimes producing much irritation, and sometimes comparatively quiet. I have never seen any evidence of the absorption of calculi. I have never extracted a tooth that had this serumal calculus on the end of the root, where there was a living pulp in the canal passing through the root on which the deposit occurred. I have been very much inclined to subscribe to the doctrine advanced many years ago by Dr. Ingersoll, that this deposit was the result of the breaking down of tissues that occurred at the end of the root.

DR. CROUSE: I want to state that I have seen this condition in cases where the pulp was alive. I have a patient from whose mouth I have taken out four molars on account of this trouble, and each of these teeth was alive, and on each one was this deposit near the end of the roots, and the pulp was alive in each instance, and there was not an abrasion anywhere around them, the teeth being perfectly firm, requiring an immense amount of force to extract; one of them had ossification around one of the roots, but not the root that had the serumal deposit.

DR. CRAWFORD: Was this an upper tooth or a lower tooth?

DR. CROUSE: An upper tooth.

DR. ABBOTT: I have an idea that a case really of hyperostosis has been mistaken for some other kind of a deposit. The last speaker made it as clear as could be that his patient was suffering from an enlargement of the root of the tooth. I fancy that every one of these cases will be found to be due to some enlargement of the cementum of the root of the tooth from an irritation of the periosteum.

DR. PEIRCE: The correspondence existing between this form of pyorrhea and the gouty diathesis has been recognized by many clinicians. How often has it been stated by such writers that one of the accompaniments of gout is a loosening and falling out of the teeth.

It is very customary in the practice of medicine, where the clinician finds that quinine effects a cure, to assume that there is some malarial or intermittent condition. Now, when a patient, suffering intensely with pain at the roots of the teeth accompanied by inflammatory conditions, by abstaining from meat, and by the use of remedies which are commonly used in gout, gets well, it is fair to assume from that fact that the condition was allied to gout.

DR. RHEIN: The case described by Dr. Crouse is typical of some cases that have come under my observation, and I would refute the assumption of Dr. Abbott that there is any question as to the correctness of Dr. Crouse's diagnosis. Some men constantly assume that other men are incapable of observing cases carefully, because they have never happened to see such cases themselves. I would like to say to Dr. Crouse that I have found very beneficial results from the removal of the pulp in such cases. I would say further, in reference to these rare cases, that the ultimate result is not only the deposit on the end of the root, but there follows the resorption of the root itself, to the extent sometimes of almost penetrating the root-canals, and still permitting the pulps to remain alive.

DR. TAFT: In view of the importance of the subject under discussion, might it not be well to appoint a commission to make special investigation of the various phases of this affection which have been presented here this morning, that commission to report at the next meeting of this body? I would suggest as members of such commission Drs. Peirce, Black, and Rhein.

It has been said that this affection has its initiative step in defective nutrition. I wish to suggest that the non-use of the teeth necessarily causes diminution of nutrition, and such teeth are more liable to this trouble for that reason.

A remark of Dr. Marshall's might lead us to think this condition analogous to alveolar abscess. I do not think Dr. Marshall meant that. In abscess there is a loss of the structure of surrounding tissues, not only of the pericemental membrane, but of the hard tissues as well. In pyorrhea this is not true. The affection seems to be confined to the pericemental structure. Can any one say how much non-use of the teeth has to do with the production of this affection? Evidently a change begins to take place in that structure when the teeth are thrown out of use. If there is a gouty diathesis, or any condition that will induce the precipitation of calcareous matter, that may be thrown down from the fluids of the body. It seems to me that reasoning in this line leads to the conclusion that, in the main, pyorrhea alveolaris is a local affection, though systemic influences have much to do in modifying its beginning and its progress.

DR. MARSHALL: With reference to diagnosing alveolar abscess, I believe we maintain that true alveolar abscess comes from a dead pulp. The hot- and cold-water test will generally be sufficient to determine whether the pulp is dead or alive, but it will not always do so. A much more certain method is by the use of the faradic current, from which there will be an instant response if the pulp is living. If the pulp is dead or nearly calcified, the patient will not notice it.

DR. BOGUE: I wish to heartily second Dr. Taft's motion for the appointment of a committee, and if I may suggest, I think Dr. Marshall should be on that committee.

There is a fact which I have not heard mentioned in this discussion, to which I wish to call attention,—that is, that there are other causes of the roughening of the upper ends of upper teeth. One cause is the deposit of calcific matter of some sort or other. A second cause is the absorption of the upper end of the root. That has not been mentioned. A third form is the roughening from causes beginning at the gingival margin.

In regard to the second cause, which has not been mentioned here, I will say that I have lately extracted one tooth with a living pulp, waiting six months before ridding the patient of the inconvenience, and finally when I did extract the tooth I found a good bit of absorption; no hypertrophy and no deposit that I could detect, and no discoloration; but I took the tooth to the Odontological Society and exhibited it there. It was as sharp as a needle on three or four of its points, showing clearly the absorption.

DR. CRAWFORD: I should like to make a little contribution upon

the symptomatology of these inflammations and disturbances at the roots of the teeth. When a patient presents himself, like the one referred to by Dr. Crouse, suffering from persistent, annoying pain, I want to call attention to the value of careful examination of the labial pulse, close to the point of irritation, on the side of the face involved. You will have the characteristic wiry pulse, but when you reach the line of suppuration the pulse is much fuller and harder, and the distinctive heart-beat is very much lessened. That will often enable you to go in and open up a center of suppuration when you would otherwise be in doubt about it.

DR. MORGAN: I should like to ask Dr. Bogue, Did you determine as to that tooth, whether it was a malformation or an absorption? How did you differentiate that? And was the point of the tooth covered, with periosteum attached?

DR. BOGUE: The patient has been in my hands for sixteen or eighteen years. Unfortunately, he has lost tooth after tooth in spite of every effort to preserve them. They were considerably loosened when he first came into my hands. The other teeth that were lost all showed characteristics of what we ordinarily call salivary calculus, and the margins of the gums were separated from the roots of the teeth; but in this particular tooth, which was a left lateral, I found no such separation. Yet the tooth was lost. It became so loose that it was useless, and I saw what I believe to be the condition I have described. I still have the tooth in my possession.

DR. HARLAN: Before this subject is entirely passed, I wish to say, with reference to the deposits on the roots of living teeth where there is no external opening leading from the gingival margin of the gum, that absolutely no evidence has been presented by any speaker to show that these deposits originated while the patient suffered from gout or rheumatism. I mention this for the sake of historical accuracy, because the transactions of this meeting will be published. There has been nothing said to show that antecedent injury had not occurred which would be sufficient to produce a deposit of this character on the root of the tooth through the agency of micro-organisms. There have been no analyses made of the deposits on the roots of teeth, that I know of, where the continuity of the gingival margins had not been destroyed. How many such deposits have been found? They are certainly rare. The deposits on the roots of teeth where there has been no break at the gingival margin are something with reference to which no investigations have been carried on, and no par-

ticular contributions have been made anywhere to show that they were to be differentiated from deposits where there was such a break. I do not dispute the fact that such deposits do occur, and have been found; but I would seriously question this point, that a sufficient number of such deposits have been found to demonstrate positively that these deposits were a result of the gouty or rheumatic diathesis.

I have listened carefully to all the discussions that have taken place, and I wish to say that without the formation of a nidus of some character under or in the pericementum, or on the root of the tooth itself, and without the aid of a micro-organism, such deposits will not take place, according to the present knowledge we have in bacteriology. All of the experiments that have been made with various agents that were introduced beneath the skin to produce suppuration without the aid of micro-organisms have proven that suppuration cannot be so produced. If these formations that are found near the apices of the root, black or brownish in color, are found without any break in the continuity of the gingival structure around those teeth, we have had pus, and if we have had pus, we have had a stagnation or an interruption of the blood-current at that point, and through the agency of a pathogenic micro-organism this deposit has occurred, and not as the result of a gouty or rheumatic diathesis; because the micrococci of gout and rheumatism have not yet been discovered in a causal relation to deposits of this character.

DR. TAFT: This deposit is, perhaps, not so much dependent on the conditions to which reference has been made as we might suppose. From whatever source it is derived, it comes into that territory in solution, while the tissue is in an abnormal condition. It may be retained and no deposition made. I have often extracted teeth affected with pyorrhea which had no deposit on them at all. Shall we therefore conclude that in the serum or in the pus there is no calcareous material? We can hardly come to that conclusion. I think this calcareous material is always present in the serum or the plasm thrown into the tissue, whether in a normal or an abnormal condition. It is deposited simply because its solvent is not able to hold it longer in solution, and so it is precipitated upon the root or roots of teeth which afford a point of lodgment. My impression is that the presence of these deposits is merely coincidental, and that it is not the gouty diathesis that produces this special affection.

DR. RHEIN: In replying to Dr. Harlan, I desire to make this point, that in all cases of "pyorrhea complex" we perceive a

pathological condition due to what?—malnutrition or absolute starvation.

I would like to emphasize the point made by Dr. Taft, that non-use of any portion of the maxilla would predispose toward malnutrition. We are all aware that atrophy is produced in this manner.

I would close what I have to say by bringing to your attention the clinical fact that uric acid may be found deposited upon the cementum of the root without any manifestation of anything gouty about the patient. We do find it in gouty patients, but we are just as liable to meet with it in neurasthenia, in diabetes, in Bright's and kindred diseases.

SECTION VI.—Continued.

Etiology of Dental Caries.

PAPER BY STEWART B. PALMER, OF THE SECTION.

YOUR committee invited me to write upon etiology of dental caries; to be as brief as possible, and stick to the subject. I accepted the invitation, and hope to meet the conditions. In 1874—twenty years ago—I read a paper before the Dental Society of the State of New York, entitled "Chemical and Galvanic Action upon the Teeth, and State of New Materials Used for Their Preservation." Nineteen years ago, another paper was read before the New York Odontological Society, entitled "Chemistry of Dental Caries." Two years later, the doctrines set forth in the previous papers were compiled and incorporated in the "Basal Principles of the New Departure." As a result, earnest discussion followed. The teachings were in advance of the times, and met with opposition both from prejudice and practice. Twenty years have passed, science has overcome prejudice, and the principles then objected to are empirically or scientifically admitted.

I am very thankful to meet the young members of this body who have been christened dentists since this subject was so fully discussed. As this will probably be my closing argument on the principles here presented, we will give a brief summary of the conclusions reached from the experience and investigation of many years. Those who take up this work will have advantages of higher education, better facilities for experimenting, and freer scientific discussions.

I am expected to present a scientific paper, and will do so; still, as the majority are more benefited by practical instructions, I have, so far as possible, given illustrations from actual practice. Instead of referring to galvanic batteries, I have taken various filling-materials for the elements of a battery, as they actually are, thus presenting applied

science. Also, I have made use of comparisons, defined principles, cited cases from other papers bearing upon this subject. A lesson worth learning is not too often repeated while it is unlearned.

Let us divide the subject. First, matter; second, potential relations of matter; third, electrolysis.

First. We live in a material world, and it is through the agency of matter that we enjoy our senses. Chemistry teaches that there are nearly seventy single elements, and that they combine under natural laws to form numberless compounds. Let us first understand the principles which govern the composition and decomposition of matter. With that knowledge, take the elements contained in the human body, and follow the subject to its terminus in the oral cavity. It has been a study to write this in language so easily understood as not to divert the mind from the subject; still, the first sentence contains a word most expressive that requires a definition. Dental caries is an effect of electro-*potential* relations of matter.

Second. The following definition of potential is from a late work on electricity: Whenever electricity moves, or tends to move, from one place to another, there is said to be a "difference of potential" between those two places. "The place *from* which positive electricity tends to move is said to be of a higher potential than the other." Thus power applied to a dynamo maintains the positive pole at a higher potential than the negative. By connecting motors between the two poles, cars run, lights burn, etc. Take a jar and partially fill it with an exciting liquid, in which immerse a plate of copper and zinc disconnected. The pole connected with the copper will be of higher potential than the zinc pole. No current is yet established. Connect the two elements. The potential is lowered; a current is set up, which continues according to the construction of the battery, of which there are many kinds. Instruments, when placed in this circuit, do their work,—ring bells, deliver messages in characters, or by articulate sounds. This is called the galvanic current. It is the phase of electricity which most interests operative dentistry. It is well to remember that the positive and negative relations of matter are not fixed, but relative to the two elements: thus, in a battery with zinc and iron, the iron would be negative, and by reason of its connection with the zinc the iron would be raised above its normal relations to the liquid in the cell. Thus, galvanized iron is protected from oxidation even when the zinc covering has been much wasted. Should the zinc plates be removed from the battery

mentioned, and a plate of copper be substituted, the iron would be depressed and become positive in its relations to the fluid. Substitute platinum or carbon for the iron—the copper would be positive. When we have reached the highest note in the potential scale, it is *oxygen* which we will endeavor to prove is the primary cause of dental caries.

Third. Electrolysis—description of the phenomenon: "If a binary compound body in a liquid state has a current of electricity passed through it, it is generally decomposed into its constituent elements, one of which appears at each of the points where the currents enter and leave the liquid. *No elementary substance can be an electrolyte.*"

"*Electrolysis only occurs while the body is in the liquid state.* Free mobility of particles is a necessary condition of electrolysis. Nevertheless, electrolysis sometimes occurs in viscous solids, but only in proportion to their fluidity." This has a special bearing on the question, Are the fluid contents of a tooth an electrolyte?

Dental science has been kept in the background because subjects have been discussed *en masse*, regardless of specific conditions. Early in the announcement of the doctrines contained in this paper, strenuous efforts were put forth to overthrow the theory. The most damaging was given by scientists of authority, and being true under the conditions, it was supposed to cover *all* conditions and settle the question, as it did for those who trusted authority.

To convince you that these principles were previously taught we quote the following from the paper entitled "Chemistry of Dental Caries," read before the New York Odontological Society in 1875. We say "etiology" now, but the principles will ever remain the same. Quotation: "We must start with atoms." Our knowledge of matter ends with atoms. It is by effects produced upon matter that we become sensible of various forces in nature. We have no time to speak of these forces in their relations to conditions, but will group cohesion, chemical affinity, magnetism, light, heat, and electricity, as different phases under different conditions, giving electricity the prominent position in *forces* that oxygen holds with the elements. "I believe electricity to be the bond of affinity which, through its polarizing influence, unites atoms, forms molecules, or builds mountains." Crude as the above appears, it shows that the so-called "electro-chemical theory" was founded on natural laws long ago.

Time will not allow me to mention the chemical processes by which minerals become food for vegetables, or how vegetables build

up and support animal bodies. Enough to say that elements are dissolved and unite to form molecules. Molecules are decomposed and thus enter into liquid form, as sap, or blood, where it comes under the controlling influence of vital force; or current, to go where directed and perform the functions ordained, as positively and by law as truly as metals in the electro-plating bath are directed to and become a part of the articles to be plated. Vital currents direct organic compounds as electric currents do minerals. Here we are able to introduce the most important element of all, *oxygen*, which is the most abundant of the elements. It is the active principle in the atmosphere, of which it forms about one-fifth part. It is an important element of animal and vegetable tissues. There are other elements of importance which are found in animal bodies,—carbon, chlorin, etc., which for want of time cannot be taken into account. Now we lay aside the chemical plane on which we have studied the battery, and for want of time pass the vegetable plane, to work upon animal tissue. There are three planes: First, inorganic chemical; second, vegetable; third, animal. As we ascend, each becomes more complicated; still there is continuity of laws through all.

Organized tissues are subject to decomposition. We know that some chemical compounds are unstable. Saliva, for example, is liable to change from an alkali to an acid. The materials which compose our bodies are pre-eminently subject to decay from the unstable arrangement of chemical forces. We cannot say what life is. We can see what it does and what occurs when it fails to do. It decomposes, composes, and lifts matter from the inorganic plane up into the organic, forms bodies or tenements in which to dwell, and during a period preserves them from decomposition. The moment the soul moves out, the body drops back into the inorganic plane and becomes an unstable chemical compound, and is given over for cremation by oxygen,—not wholly by the oxygen in the atmosphere, but that which forms a large portion of the tissue. To illustrate, Faraday says, "One hundred parts of steel alloyed with one of platinum are dissolved with effervescence, in dilute sulfuric acid, too weak to act with perceptible energy on common steel," the steel being rendered positive by the presence of platinum. The application is this: oxygen being a negative element distributed throughout the compounds, sets up an electro-chemical action, and decomposition follows. The same principle is involved when gold is malleted upon frail dentine; the bruised surface becomes a chemical compound and an electrolyte

All teeth of frail, porous dentine, when filled with a metal which does not impart oxids, sulfids, or their equivalents, are condemned by the same law. The principle is this: As previously stated, all metals in the mouth stand at a potential above dentine and the fluids to which the teeth are exposed. When the fluid contents of a tooth are an electrolyte, as already defined, decay is an effect. The above has to do with electro-chemistry and secondary decay, or decay produced by electrolysis. This brings us down to another condition,—decay arising from ferment organisms and organic acids. This is a *condition* of caries, not a theory to be discussed in opposition to what has already been given. For several years past this phase of caries has been presented to the profession, and I fully agree with the conclusions reached from this standpoint, that there is nothing more to be done. The labor has been immense; important discoveries have been made relating to chemical action in the mouth, and not less important discoveries of antiseptics to prevent fermentation and destroy organisms. This condition does not embrace caries as set forth, nor does it present permanent remedies to arrest decay by the use of oxids. One is as much a condition as the other,—two parts of a whole; with either left out, the etiology of dental caries will never be settled.

The oral cavity presents complications not found elsewhere. It is bounded by vital organic tissue. The liquid contents,—saliva, food, mineral remedies, etc., and all, subject to thermal changes; the teeth so fixed as to contain the contents in pockets or cavities, and with all during periods when the mouth is open, in speaking or eating, an undue current of oxygen is brought in contact with the fluid, which causes fermentation, as mouth-breathing plainly demonstrates, with consequences which have been fully described in modern articles upon this subject. Oxygen in this form is a gas, but none the less a negative element. The electrolyte to which it has access has been raised up to the animal or vegetable plane, in which condition it is ready to be acted upon. We can get an idea of the influence of the effects of oxygen by that produced by hydrogen peroxid, H_2O_2. The teeth would soon be destroyed by this additional amount of oxygen. As already stated, vegetable or animal compounds when deprived of vitality or circulation die and decay. Even an apple may be preserved for a long period, provided its organic construction is not broken up. Let the fruit be bruised or frost-bitten, the portion so affected, though the skin is perfect, begins to ferment, because that

portion no longer sustains the relations of organic construction. Cut out the bruised portion with a thin, sharp blade, dry the surface, and the wound is healed. The same law governs in preserving dentine by filling; cut out the disorganized surface, insert a filling which excludes moisture and oxygen; there is no secondary decay. Bruise the surface by harsh gold or malleting; decomposition follows. In case the dentine is below normal, the deficiency of lime or non-conducting material should be supplied by an agent which is not affected by oxygen, the most convenient being an oxid, sulfid, or carbonate. The question was recently raised, "How is it, if oxygen destroys teeth, it also preserves them?" The ranchman on the prairie understands the danger of the effects of oxygen finding its way to his dwelling through prairie grass. At suitable times he burns a space around his stacks and dwelling; he has satisfied the demands of oxygen by oxidizing the environments. When the fiery storm comes, it stops at the line prescribed. The organic constituent of a tooth of low-grade structure is an electrolyte, and subject to the destroyer, oxygen. If the surface of the dentine is filled with a compound which has passed through the ordeal, the effect is to raise the positive element in potential to equal oxygen, and there is no current, no decay.

To give a partial illustration of this principle, as well as to illustrate the difference between the two conditions mentioned, imagine a child whose deciduous teeth are decaying. Put the same under the best known antiseptic and prophylactic treatment. In addition, treat all the cavities and softened dentine on one side of the mouth with nitrate of silver without excavating or filling. The results will establish two facts: (1) That the chlorid or oxid of silver raises the potential of dentine above that of the secretions of the mouth; (2) that it is more durable than antiseptics.

The following is from the paper mentioned, written nineteen years ago: "It is on this principle that nitrate of silver acts when it turns the teeth to a dark color and checks caries."

We are now prepared to announce oxygen, under the laws which govern the positive and negative relations of elements, as the primary agent that produces dental caries. We see a manifest demonstration of this universal law during electric storms, between the potential of the atmosphere and the earth, between the north and south poles of the globe, or a magnetic needle. The dynamo has its poles; so do the elements in a battery, as well as galvanic and electric currents.

The same law is visible in the union of oxygen and hydrogen gases, acids with alkalies, etc., lacking poles by which to generate currents.

As proof that oxygen is the cause of caries, we use in practice remedies to arrest decay, or satisfy oxygen, oxids which are proof against oxygen, and in doing so recommend fillings which furnish oxids by being oxidized, or lining cavities with the material ready prepared, in contrast with gold, which furnishes nothing. A metal filling in the mouth is of a higher potential than are the organic constituents of dentine. Dentine below normal is an electrolyte. Thus there is a current from the filling to the dentine which will decompose the moisture in the dentine, liberating oxygen, which action is attended with acid formation. Dissolution of the lime-salts is the result. Gold furnishes such current. Thus decay around gold fillings in frail dentine is according to a law which manipulative ability cannot counteract. In establishing the principles under discussion, we deal with oxids, but wish it to be understood that compounds of carbon, chlorin, sodium, calcium, etc., produce like effects. Time forbids mention of more than oxygen. To use a plain figure, people seldom have smallpox more than once, and the disease usually honors a genuine scar. The same law prevails with attacks of oxygen. It is well known that tin preserves frail teeth better than gold. The reasons are, (1) Tin is easily adapted to the walls of the cavity, thus insuring perfect plugs; (2) its conducting power, according to Cassidy, is as follows:

Silver	1000
Gold	532
Tin	145
Normal Moist Dentine	15

Thus tin is a poor conductor, and its potential standing would doubtless be lower than its conductivity. But its most important virtue consists in furnishing an insoluble stannic oxid, between dentine and the plug, through which oxygen will no more pass than it will pass through a wet surface to burn wood. This process is simple oxidation, quite unlike that which occurs when tin is used for the same purpose, to line cavities under gold. The following is the result of patient study, and I believe the conclusions are correct.

When gold and tin are joined in a filling, the portion which is exposed to moisture interchanges atoms by electrolytic action, the same as though mercury was placed on gold. There is an alloy of tin and gold at the union by which a portion of the tin is raised by induction to the same potential as gold. This influence does not extend into

the tin beyond one or two thicknesses of tin foil. When tin is used to line cavities for guard fillings under gold, not to exceed two layers of ordinary tin foil, the dentine will be furnished with a carbonate, and gold can be used when it would otherwise prove a failure. Here is a point which should not be overlooked: that gold in contact with tin as a cavity-lining by the aid of the moisture in the dentine forms an alloy of gold and tin, which is insoluble. This principle does not extend beyond the thickness of about two leaves of tin foil; when more is used as a guard filling, say three or four thicknesses, the addition over the tin which will be preserved by the gold is liable to be dissolved. The black compound thus formed will be soft, not of sufficient body to resist brush or pick. No decay occurs so long as the paste remains. I should add that when a considerable body of tin is used as a guard filling, no such softening occurs. A plug made of tin and gold, one-fourth or one-half tin, the rest gold, the joint is perfect and the tin is solid throughout. Without the body of tin for backing, the thin layer is exposed to galvanic action, aided by the moisture in the dentine, without the metal to form a hard oxid. At least, the results are as stated. I claim nothing for the combination of tin and gold; I only speak of the science of its combination so that universal results may be obtained. In the paper read twenty years ago, the prejudices were so strong against amalgam I dared not establish the principles upon it, but used tin as we have already done. We feel free now to produce evidence from any source which will be of interest to the profession.

I hold the same views regarding amalgam and its influence in producing caries as I did many years ago. The most serious objection to amalgam is what is called shrinkage; it *is* that in effect.

Amalgams are made which do not shrink as tested by the most delicate instruments, which also stand fluid tests in tubes; still, when worn in the mouth, do admit fluid circulation which reduces the plug and enlarges the cavity. This statement is not made without scientific proofs.

Amalgam which is composed of alloy, cut or filed, and mercury, differs from gold and tin in this respect: it is not a homogeneous compound; it contains, besides the two or more metals that compose the alloy, two elements of different potentials, or positive and negative relations. There is a positive which is amalgamated, and minute particles of alloy *partially* amalgamated, distributed throughout the mass. This can be demonstrated either by dissolving an amalgam

filling in dilute acid (a metallic powder of the unamalgamated alloy will remain), or by filing a flat surface on an old filling. Wet the polished surface with acid, and slowly draw over it a fine point of platinum in circuit with a galvanometer; the needle vibrates with great rapidity from positive to negative as the negative and positive elements are reached. This is a condition to be encountered in all amalgam fillings. The setting of amalgam depends upon the filings taking up the mercury. The alloy must be in excess of what is absorbed at mixing, or the plug would be too soft from excess of mercury. The outcome is this: each particle of unamalgamated alloy is an element negative to the other portion, which is perfectly compounded; consequently there is local galvanic action all over the surface of the filling. The chemical effect is this: as soon as moisture returns to dentine in contact with amalgam, galvanic action is established; in *normal* dentine oxidation fills the dentine with oxid or sulfid, and no harm is done. When the plug is inserted into a cavity below normal, unless the alloy contains copper or some metal that will readily give off a compound to fill the dentine, the mercury will be dissolved from the alloy, which gives the roughened appearance of all inner surfaces of amalgam plugs. Nor is this all; when local action is too vigorous the lime element of the dentine is dissolved, and thus the cavity enlarged and the plug reduced. This state of things occurs always under the same conditions. To meet it we need to change conditions, and if it was *filling teeth*, instead of caries under discussion, we would mention lining cavities to overcome the difficulty; but this, and I think the most important remedy, *is* a part of our subject; and for this alone has amalgam been introduced in this connection. This lesson came from studying battery action. It is well known that commercial zinc contains other metals, iron being the most common. Small particles of iron are distritbued throughout the zinc, and cause local action on the surface, in dilute acid so weak as not to dissolve pure zinc. This is analogous to an amalgam filling with particles of unamalgamated alloy.

The remedy for local action on zinc is to amalgamate the zinc which covers the iron. There is but one element presented to the action of the acid; that is mercury, or I might say, an amalgam of mercury and zinc. The action of the acid through the agency of the current is to dissolve the zinc, while the mercury prevents the acid from exciting the iron. Thus no local action occurs on the zinc while covered with mercury.

The same principle governs amalgam. Local action goes on when the moisture reaches the plug, because the unamalgamated filings are negative to the general mass. By lining the cavities with one or more layers of tin foil, which is readily done by covering the cavity with tin, pressing it down with a ball burnisher or soft compress, no matter if the tin overlaps the cavity, the mercury readily cuts it off at the enamel border.

By this lining the benefits of tin are realized through oxidation, which does not discolor dentine. The tubuli are filled with an insoluble compound; no local action takes place to cause shrinkage of plug. A high grade of amalgam may be used. I have not used copper in amalgam in over a year. The preserving qualities of amalgam consist in the oxid or sulfid imparted to porous dentine. Stannic oxid is not objectionable in color, and it prevents shrinkage from galvanic action, as occurs in amalgam without lining. Time forbids taking up root-filling. In addition to what has been given in late treatises on this subject, where antiseptics are recommended, I will offer suggestions from my present practice which are based upon the same principles as for crown fillings. We are to remember that the root-canals of teeth, or pockets around roots below the gingivæ, are in an alkaline instead of acid field; that is one of the conditions where oxygen gives alkaline reaction. Thus root-canals, though unfilled, do not become enlarged like cavities in crowns, hence acid treatment is indicated and beneficial in destroying micro-organisms thus located.

The one important point I will mention is that antiseptic remedies serve me best which are held in solution or mixed with *aqueous* liquids. I will give my reasons, based upon a year's observation with scores of experiments. Bear in mind that I have reference to the minute capillary canals at the apex of the root only, including those so curved that a fine broach cannot be passed through, and those where the pulp is extracted at the time of filling. To illustrate, I will describe a case treated the day of this writing. A superior cuspid had been previously treated for devitalizing the pulp, which came away readily to the finest point. Slight hemorrhage followed. Oxychlorid was placed upon the slab ready for mixing. Some of the liquid was introduced, which checked bleeding. A thin mix was made and the canal filled. A fine gutta-percha point was introduced, which reached the apex and forced out the excess of fluid.

This treatment has been recommended, and is not offered as new. But why use the solution of oxychlorid instead of carbolic acid, crea-

sote, or the essential oils? Because the chlorid of zinc with the oxid of zinc mix readily with the water in the canal. The point or opening is a spring which cannot be dried. Capillary attraction keeps the fine canals filled until the leak is stopped. Notice what occurs when any oily substance is used. Unless by pressure the water is forced out of the root, water remains and a portion of the oil next to it, which I cannot volatilize even with broaches heated by electricity. In time the oil is oxidized; there being no mineral substance to form an insoluble compound, the canal becomes filled with septic matter. With all that has been accomplished, root-filling has not been reduced to a science by which positive results are assured.' I believe in the principle introduced in this paper, that oxygen is as much the cause of putrefaction in roots as it is in crowns, through fermentations and acids. The most successful treatment for root-filling is evidence of this statement. Chloro-percha and gutta-percha points are used with fair success. Why? The water is driven out and the opening closed. The filling, of course, changes and becomes odorous from gases arising from some change in the gutta-percha, not of the oxid. On the average, gutta-percha filling consists of about one part gutta-percha to five and one-half oxid of zinc.

The permanency of gutta-percha consists in the oxid which remains after the gum has undergone change. The preponderance of the oxid prevents further oxidation. Again, look at oxychlorid for filling roots and lining cavities. Both the fluid and the powder confirm the statements. This is a compound containing a chlorid and an oxid in an aqueous fluid, which mixes readily with that in the root. The benefits of chlorid of zinc over oxyphosphate for filling roots consist in the chlorid, which contains zinc, in addition to the powder, while the liquid phosphate is non-metallic. Doubtless there are other oxids better than oxid of zinc. Chlorids and carbonates answer the same purpose; they should be used in aqueous solutions. I am not pretending to say that oxychlorid is the best material for filling canals. I wish to establish a principle, and save you the trouble of wasting time trying to overcome natural laws, except by change of conditions.

In the discussion of the paper read twenty years ago, a member spoke as follows: "Dr. Palmer has given the society his views upon the subject. He has made statements, but they all seem to be *ipse dixit.*" And this has been true with much that has been said since, because there are no books for authority, with no little opposition,

and only a few individual supporters. To prevent repetition of this *ipse dixit* in relation to the difficulty of drying canals, volatilizing oils, etc., in the mouth, I will put proof in your own hands. Particularly this should interest every professor of operative dentistry. With very simple apparatus, which will be described, and a few hours' experimenting in the laboratory, knowledge can be gained of what is not done, that practice in the mouth fails to furnish. Drying open-ended root-canals and volatilizing oils with hot-air currents or heated broaches is much more satisfactorily done in the mouth or on paper than in glass canals in the laboratory, where imperfections can be seen. I will describe the apparatus for the reader who may not see the card to be passed around.

Take a clear glass tube, with a bore about No. 9 or 10 wire gauge, heat a section with a blow-pipe or over a small flame of a Bunsen burner, draw the ends quickly apart, break the thread of glass the distance from the tapering ends desired for the length of root, and with a sharp file cut across the tube at the beginning of taper. The artificial root is ready, funnel-shaped and tapering to a point. Take a piece of copper wire, No. 19 or 20, point it as a broach, secure it in a handle. Improvise pliers for holding glass root, and with a small alcohol lamp the apparatus is complete. Touch the point of root to water, and it will be filled before it can be withdrawn. Hold the broach over the flame, back of the glass tube. See how long it takes to dry it. Wind the end of the tube with cotton saturated with colored water, and try to dry it. Put any oil in the root, and try to volatilize it with the hot broach. Take a tube and fill it with paraffin or wax, and it is done perfectly ; but that is not a condition found in the natural root in the mouth. Either water or oil remains at the apex. Take a glass root in that condition and fill it with wax. At the point will be found a soapy mixture quite unfit for permanency. The above experiments are well worth a trial for any one who desires to know what is done, and what cannot well be done.

In closing, I believe that the etiology of dental caries is the effect of a universal principle based upon the potential relations of matter, oxygen being the principal element, aided by electrolysis and capillary attraction under direction of electrical energy.

DISCUSSION.

DR. ABBOTT: As far as the electrical theory of dental caries is concerned, I placed myself on record many years ago. But there is one matter in the paper to which I wish to call particular attention. It is the recommendation of the filling of the pulp-canals of teeth. For many years I practiced the attempt at as thoroughly cleansing and drying the root-canals as possible. Many canals I found it impossible to dry at all, and about four years ago I gave up the practice as a bad job, and have never attempted since that time to dry pulp-canals in any way. I advocate strongly, as the doctor has recommended, the use of aqueous solutions in the cleansing of pulp-canals, for they do it much more readily than anything else that I have ever used. As to his experiments in the use of carbolic acid, creasote, or any of the essential oils, I take it for granted that Dr. Palmer knows what he is talking about when he gives the results of his experiments. I never obtained satisfactory results from the use of those materials. I could never accomplish, apparently, what I tried to do. So that I have adopted the plan entirely of using aqueous solutions for the washing out of root-canals, which I do with a syringe, using the bichlorid solution, one in ten thousand, and the moment that that is done, I fill the root-canals of teeth *without drying them at all.*

In the *International Dental Journal* for August, 1893, will be found a paper which I read before the Odontological Society of New York. Those of you who read that paper will remember that in it I said that I would not attempt to fill the root-canals of a tooth while any peridental irritation or soreness was present. Since that time I have been experimenting quite extensively in filling teeth of that kind immediately, unless they were so very sore that I could not work on them. The filling of the root of a tooth, when there is considerable peridental inflammation, is a therapeutic measure which tends very materially, if not almost entirely, to cut off the supply of the irritating material which goes to keep up the trouble. We know it was the practice many years ago to treat teeth in this condition a considerable length of time, and, as Dr. Palmer remarks, they often have been over-treated,—treated to death many times.

In cleansing and filling the root-canal of a tooth, all irritating material which keeps up the peridental trouble is shut off, provided it is thoroughly done. Then all you have to do is to reduce the inflammatory condition in the periosteum around the tooth itself. I have recently filled teeth of this description while there was consider-

able of a cyst at the end of the root, perhaps as large as the end of my little finger, and in less than a week's time I have had the cyst disappear by simply shutting up the canal thoroughly at once, and then applying counter-irritants to the gum.

DR. CRAWFORD: There are two conditions that would explain the presence of the lump which Dr. Abbott has described, and which we have all seen. One is that of abscess or pus-sac, and the other is that of induration. If that lump is caused by a pus-sac, I should like to know what becomes of the pus after his treatment?

DR. ABBOTT: There is no way that I am aware of for determining the contents of a swelling of this kind without using an exploring needle, so that we take it for granted that it is filled with a fluid which is not pus. Pus would indicate that it must be discharged in some way, but it is evident that absorption takes place. If it is pus, then whether fatty degeneration takes place, and absorption afterward, is a question that I am not able to answer, although that does occur very frequently where the pus is held in a sac, and it may be that that occurs in these cases. All I know is that without puncturing, without exploring with a needle, I have destroyed them by simply performing this operation in the way I have stated.

DR. PALMER: I promised during the reading to put each one in possession of the proofs of what I stated. I neglected to do so on account of not wishing to distract the attention of members; but I should like each one of you to see the tubes which I have here. It is easy to see what I am doing in experimenting on root-filling.

DR. MARSHALL: It was my good fortune—I always consider it so—to be a neighbor of Dr. Palmer at the time he first presented his paper on this subject. My office was near Dr. Palmer's, and I had the pleasure of seeing him go over a great many of the experiments which brought him to the opinions which he advocates. In those days I heard some very harsh things said on that subject, and so have some of you who are older. Some of you who are here present said harsh things about the "new departure." But, gentlemen, do you know that the introduction of that idea changed our practice ot filling teeth very materially? How many of you ever thought of putting a pellet of tin at the cervical border of gold fillings until after this question was brought up and agitated by Dr. Palmer? Secondary decay often occurred at the cervical margin of fillings made by the best operators. Dr. Palmer demonstrated that a layer of tin or amalgam would prevent this, and gave his reasons therefor, which

time has proved were correct. I say, all honor to Dr. Palmer. He made some experiments at that time to substantiate views a little outside of the line of dentistry, perhaps. He made a statement in his paper to-day that led up to this, that all chemical elements were electrically either positives or negatives, and that all matter could be divided in the same way. Dr. Palmer, with his apparatus, showed me that a great many of the foods which we eat in pairs, because they are more palatable that way, are one positive and the other negative. He claimed at that time that on that account we get a stronger zest or taste by the introduction of certain foods in pairs. For instance, a piece of ham and a cooked egg, moistened with saliva or with a slightly acid fluid, would cause a deflection of the needle of the galvanometer when the poles were connected; with roast turkey and cranberry sauce the same result would occur. From these and other experiments, he arrived at his theory that all matter stands in one relation or the other, either positive or negative. You might say there is no practical value in this. I think there is.

With regard to the root-filling which the doctor has described, I think a good many of us have used similar methods, but perhaps have done it blindly, without the scientific understanding with which he has done it, and which his experiments show. I have a lower left second molar in my own mouth, which I was unfortunate enough to have badly handled, and the pulp died. The canals were very narrow, could not be opened up properly, and finally the roots were filled, using the oxychlorid, having first passed the liquid down into it, and then the thicker fluid following that. That tooth I have saved by that treatment. Those roots I believe are perfectly filled, for after the first two or three days there was no irritation. I have practiced that myself a great deal for several years. This information I got from Dr. Allport. It was a favorite method with him.

When I get home I am going over the experiments that Dr. Palmer has suggested here, and see what results I get. I feel confident from what he has said that I shall find the same result that he has found.

DR. HARLAN: After Dr. Palmer read his paper, I took the trouble to re-read it. Just what relation the filling of the roots of teeth has to etiology and physiology I don't understand; but as it was incorporated into a paper on the etiology of dental caries, and as it has been spoken about, I concluded to ask Dr. Palmer how an essential oil could become oxidized in the root of a tooth; also, how gutta-percha could become oxidized in the root of a tooth; and to ask the

further question, If gutta-percha is an oxidizable substance, why is it that the man who laid the first Atlantic cable, and those who have since followed, used an oxidizable substance for covering that cable in the water? Of course this is not the Section where the filling of the roots of teeth should be considered at all, and I don't intend to enter upon its discussion; but I wish to say that from the theoretical standpoint, from the practical standpoint, and from the scientific standpoint, the best material we have to-day for the filling of roots of teeth is gutta-percha. It is one of the unalterable substances that dentists use that can safely be placed in the root of a tooth without danger of disorganization.

With reference to the introduction of tin beneath the filling, that honor does not lie with Dr. Palmer. The late Dr. Abbot, of Berlin, a graduate of the Baltimore College of Dental Surgery in 1850 or 1851, had used it for nearly twenty-five years before this paper was read. The late Dr. Amos Westcott and other dentists in the interior of New York State and elsewhere in the United States used tin in the bottom of deep cavities as early as 1843 and 1844, thirty years before the "new departure" was thought of. So that was not a new idea. Some of the gentlemen who used tin at that time did not use it with the full understanding of its value in such locations, but they used it because it occurred to them that it would be of utility.

With reference to the main subject of the electro-chemical theory of decay, it is a continuation of the experiments of Bridgman, published, I believe, in 1834. At the present time, with the published results of the experiments of Miller and Black, the electro-chemical theory of caries has no ground to rest upon. It may be that there will be some modifications relating to the exact method by which teeth are destroyed from the effect of micro-organisms; but it seems absolutely determined by the experiments of Miller and Black that decay of teeth is essentially the result of the agency of micro-organisms, through their excretory products. I don't say this with the intention of belittling in any way experiments of this character; but I simply say that the electro-chemical theory of the production of decay is not proven, and that the experiments of Miller must stand until something better and more definite is presented which can be substantiated, and experiments of which can be demonstrated before scientific bodies.

DR. MARSHALL: As I understand Dr. Palmer's paper, he does not antagonize Miller's theory. Dr. Palmer is talking more particularly

about secondary decay than of primary decay, claiming that by means of the introduction of metal fillings into teeth a battery is established in the teeth. He claims that that accounts for secondary decay in a great many cases which you cannot account for in any other way. In other words, he means to say that it isn't always, by any means, faulty manipulation which is responsible for secondary decay; that there is something else which comes in to break down our work. Now I venture to say that there is not an operator in this room—I don't care how fine a one he is—who does not sometimes have a patient come back in the course of two or three years with a fine gold filling losing its integrity at the cervical margin, where the operation was as perfectly done as it was possible to do it; yet secondary decay takes place. Dr. Palmer's point is made there. He tries to show us by this electro-chemical theory how some of our failures occur,—not all of them, by any means.

I did not make the statement, when I was on my feet before, that Dr. Palmer invented or discovered the use of tin as a protection; but I do say that he was the first man to give us a scientific explanation of it. I don't think any one can gainsay that statement. He is entitled to that honor.

DR. HARLAN: In order that no misconception may go out to the world, I wish to say that the causes which produce decay in the first instance are the causes which produce decay in the second instance, and that the electro-chemical theory has nothing whatever to do with it. If primary decay of the teeth is caused through the agency of micro-organisms, secondary decay is caused likewise, and the conditions cannot change. You cannot rearrange chemistry or biology to suit a case where metal has been introduced into a tooth, because, in the case of gold, it is an absolutely inert substance, unchangeable and unoxidizable, insoluble in any fluid of the mouth or any fluid that is introduced into the mouth. Consequently secondary caries under a gold filling must come from the same causes as primary caries, the infection being always the same.

DR. CRAWFORD: I should like to ask Dr. Harlan, as a therapeutist, which pole is it that attracts acids, and which pole is it that attracts alkalies, in electrical therapeutics, if he can answer that definitely?

THE PRESIDENT: He has not made the statement that either one does.

DR. CRAWFORD: I ask him the question, then.

DR. HARLAN: I don't know what Dr. Crawford seeks to obtain by asking this question.

DR. CRAWFORD: I will explain. I once heard a very interesting discussion upon the subject of electro-therapeutics, and an expert in the use of electricity insisted that one pole attracted acids and the other attracted alkalies. To illustrate: Take a body and place a negative pole upon one side and a positive upon the other, so that you could pass medicinal agents through it under the influence of electricity that wouldn't pass otherwise, and the scientific point that he tried to emphasize was that in the use of the battery, or the placing of the battery upon the organism, one pole had a tendency to accumulate acids at its point of contact, and that the other pole had a tendency to accumulate alkalies. If that be the fact, there may be more in the electrical influence as an etiological factor in the production of dental caries than we imagine. I am like Dr. Harlan in reference to the ultimate and absolute cause of dental caries. In its incipiency, in its primary stage, or in its secondary, the cause is one and the same thing. But in the accomplishment of it there are many factors that may enter into its production, and while the specific influence is one and the same thing, that would not act alike under all circumstances and in all environments; and if this thing of electrical influence has a tendency to accumulate acids at one pole and alkalies at the other, it may be that the electrical influence becomes a factor to that extent. I want to prophesy that the dental profession will demonstrate that the aggregate results of the introduction of amalgams have been more hurtful than beneficial to the human family.

DR. JACK: I have a few words to say in explanation of my own inability to understand clearly or to believe in the force of the theory which Dr. Palmer has repeatedly attempted to demonstrate, as to electro-chemical causes of the decay of the teeth. If that were true, it would seem to me that all portions of the margin of the cavity, since they are bathed in fluid, would furnish means of conveying any current that may be excited, and that all portions of the margin of the cavity should be influenced in the same way, as well as the cervical margin. Yet we find in the majority of instances where we are so unfortunate as to lose our fillings, that these injuries by secondary decay occur at the cervical margin. Now, the hypothesis which appears to be clearly proven to the minds of large numbers of our profession, involved in the demonstrations of Miller and Black, will account for the occurrence of secondary decay at the cervical margin, because

the conditions there exist which most favor bacterial activity. Electrical force acts with equal energy in any given environment when the resistances are the same. Bacterial energy is greatest in proportion to the degree of stagnation, and the most abundance of suitable pabulum. These considerations have led me to doubt the electro-chemical theory, and to hold fast to the views abundantly proven by Miller and Black.

DR. ABBOTT: There is one point in this question that I never yet have been able to understand. If a filling were perfectly made at the cervical margin as well as everywhere else, and equally well finished, I should like to know how it is possible for any destructive elements to be present between that filling and the tooth, whether in the form of organisms or anything else. I claim that failure is due to the fact of imperfect manipulation at the cervical margin, as a rule. You may say that that is a locality where more or less particles of food, etc., are retained. If that be the case, then you have not what you would call secondary decay, but you have primary decay commencing upon another part of the tooth. It commences just the same upon the surface of the tooth as it did before. But I cannot conceive of the presence of organisms where the filling is properly put into the tooth, in that locality any more than anywhere else. Every one who has studied the subject at all carefully I think will testify that there must be something that will dissolve the lime-salts in the first place, to start caries of the teeth anywhere. This something, of course, must be an acid having an affinity for the lime-salts. This acid may be produced by means of electricity, or of organisms, or by taking acid substances into the mouth, such as fruit, pickles, and medicines which are strongly acid. It makes no difference, in my judgment. Dr. Palmer has an idea—and I think it is a very good one, too—that in very many cases where fillings are put into teeth, a tooth is struck with an instrument in such a way as to break it down to a certain extent. When it is broken down in the slightest degree, then you have, of course, a condition which leads to further destruction of its substance, because there will be a point where there will be an electric current passing from the filling into the tooth, or from the tooth into the filling. Not only that, but it will retain in itself a certain amount of acid after the filling is put in; and then if there is any possibility of adding to it in any way from the surface, which is very often the case, because these breaks always occur near the margin of the cavity or right at the margin, then that crumbled por-

tion, of course, is added to constantly, and you have then your battery working, and the acid becomes intensified by the electric current which is passing from one substance to the other. This, as I understand it, is Dr. Palmer's idea.

DR. BOGUE: Perhaps Dr. Abbott will tell us how long that battery continues to operate?

DR. ABBOTT: It never ceases so long as the condition is present.

DR. PALMER: I care to say very little in addition to what I have said, because you will notice when you read the paper that it is written with great care not to antagonize the organic theory, and due credit is given to that because I believe in it. It is one phase of dental caries. Now I want to make a statement why this dispute arises. The same thing comes up in all our discussions. It is because we mix conditions, or don't present the specific conditions under the laws that govern the action. Some have spoken about the difficulty of treating a certain portion of the cavity, as when it is broken down or softened, and have mentioned various reasons why decay occurs there. The portion which is softer is an electrolyte. I am plastic in the hand of science, and tell what experiments teach me. Some say there is nothing in the theory I have suggested; that a tooth is not an electrolyte; that an electrolyte is something which will conduct a galvanic current and be decomposed by it, and consequently a tooth is a non-conductor, and has nothing in it more than the natural moisture of the dentine, and many believe it.

What are the facts? A *normal* tooth is not an electrolyte. Now, look at the discussion that went on to prove how long a gold filling would last. We know that a gold filling may last fifty years, and that it might last one hundred years in a normal tooth. What is the law of electrolytes, as taken from the highest authority that I can find? It is that a substance which is not a conductor is not an electrolyte; nevertheless, in proportion as it admits of the mobility of its molecules in a fluid condition, in that proportion it is an electrolyte. Take a child's tooth which commences to decay. None of you now would fill it with gold with any hope of success, although you used to try the experiment. It is an electrolyte, because perhaps it is fifty per cent. of organic matter, and you would be fighting a law. You could not do it successfully. When you have filled it two or three times, you have approached very near to the pulp. Now, if at the cervical border any portion of the dentine is softer or below the condition of the other parts, that portion is an electrolyte. I wish to

state a fact, that a piece of gold, or platinum, or any metal, placed in the mouth, I do not care where you put it in the mouth, as soon as it is wet with saliva, assumes a potential. It is just the same as when you take a negative plate and drop it into a battery without being connected. It assumes, if a negative plate, a positive potential at the pole, and all you have to do is to connect that to the zinc plate, and the current flows. So every crown, bridge, or plate in the mouth containing gold is at a higher potential than the fluids of the mouth.

How do we know that? If scientists had been as familiar with the galvanometer as they are with the microscope, they would not have made the statements which they have made, because with the galvanometer we are able to determine just what is positive and what is negative. The needle of a galvanometer, when touched by two fillings in the mouth at any distance, if tin and gold, will respond. To carry this out, to see how far this would work, I have one filling of gold and another of amalgam that have been worn in the mouth, connected in circuit with the galvanometer, and it is amusing to see the dentists who call in to see it. Take one filling between the thumb and finger, and the other the same way in the other hand, and wet them with saliva, and the needle will move from five to ten degrees. I could tell at the other end of the room which hand the amalgam filling was in, and in which the gold. We are not talking about things which are guess-work at all.

What is the consequence of one potential being higher than the other? In the normal tooth no injurious effect whatever is produced. But in a tooth the substance of which has been lowered by bruising it comes back into a chemical compound instead of an organic one, a condition which is susceptible of decomposition. I presume my experience has not been different from that of many others. I have sometimes had the misfortune to see that during an operation a gold filling had become loosened. I would make an appointment for the next day to refill the tooth, leaving the loosened gold filling in the cavity. The result would be that in twenty-four hours there had come a sensitiveness; so that to guard against that I now remove the filling and put in gutta-percha, rather than have the sensitiveness produced. Does any one suppose that during that time there has been fermentation, and that micro-organisms have invaded that territory to produce that result? Not at all. It is caused when moisture enters, the gold is at a higher potential than the tooth around it, the fluid is decomposed, an acid is produced, and sensitiveness follows.

I only brought these things in, in regard to the root-filling, as suggestions. Some one has thought that I claim the idea of tin under gold-and-tin fillings. I had the pleasure of doing some work for a sister of Dr. Nash. She had some work done by Dr. Abbot, of Berlin, or by his method,—some large crown fillings, a composition of tin and gold. All over the surface of those fillings were little pits. That led me to investigate the cause of the trouble. All that I have said I claim is to know how far gold will preserve the tin, and what it will not do. And, as stated in the paper, when gold is placed against tin foil, if the tin is not more than two thicknesses, that will not be destroyed in the mouth, and can be safely trusted for lining under gold. When I build up a tin-and-gold filling,—and I have done that many a time,—I take one layer of gold and one layer of tin, and cut them into blocks and make the filling. I would not wet the gold before putting it in, because, if you pack it firmly, there is no electrical action, no electrolysis going on. The tin and gold will remain just as you place them there so long as it is dry, and the edges only will become a compound; but if you wet it and build it up, you will have no trace of gold and no trace of tin. It will be an alloy of gold and tin, hard like amalgam, and it does not discolor the dentine. I am not recommending this filling, but I am giving you the fact as it occurs. It will occur every time. If you add too much gold there is no harm done. The gold will remain as gold. If you add too much tin, the gold surrounding the tin, except the first two sheets, will be dissolved by electrolysis, and a pit will be formed. Now in lining I prefer one or two thicknesses only, under the gold, to produce the effect. If I am going to use more than that, I put in alternate layers of tin and gold, for the reason I have mentioned. Then I have something insoluble and not to be washed away. At the same time, you can unite tin-and-gold filling, half and half, or one-fourth of one, and have them do well. If the tin and gold are put together in any quantity, there is no separation between the two at the union.

Whether the tooth is or is not an electrolyte depends on the amount or percentage of organic or inorganic matter or fluid contents which may be in it. I care not what any one says; it cannot change my mind. It couldn't change your mind if you could see it demonstrated. Why that is questioned in the way it is, is simply because gentlemen don't even try the experiments.

DR. MARSHALL: Will you answer Dr. Crawford's question with regard to the positive and negative poles?

DR. PALMER: When gold is put in, that is a negative filling, and a fluid beneath it produces oxygen, which is an acid. That is what causes this sensitiveness I have mentioned. That is why I use the tin.

DR. CRAWFORD: Do acids go to the positive and alkalies to the negative?

DR. PALMER: There is a change sometimes in the fluids, but where the deposition of the fluids takes place at the pole—that is, running from the positive to the negative—there you have the production of an acid.

DR. CRAWFORD: The definite statement was that the alkalies that you put in the organism for treatment, medicines of course, would tend to one pole, and the acids to another. What I want to know is which way they will go.

DR. PALMER: I think I can answer you. If you have a battery made by immersing copper and zinc in sulfuric acid, the action goes on, and oxygen is the positive, or the acid, at the zinc, and the hydrogen which is set free passes over onto the copper plate, and coats it over with bubbles of hydrogen, and the battery ceases. That is why a battery of copper and zinc is not constant. I do not know exactly how you apply your medicine, but the hydrogen, which is the alkaline element, comes back onto the negative plate, while the acid from the positive current, passing over onto the positive plate, there deposits or evolves oxygen.

DR. TRUMAN: If, instead of a metal filling in the cavity, you place raw cotton in that cavity, in twenty-four hours there will be excessive sensitiveness in that cavity. Where do you get your electrical current between the cotton and the wall of that cavity? Is there any electrical current there?

DR. PALMER: Not any. There is no battery there to produce it; the sensitiveness comes of fermentation. It should be borne in mind that there is a difference between chemical action and electro-chemical action. All chemical action would be electro-chemical action, provided it had an opportunity to gather itself up into polarity, and form a current to pass around. When we put a metal, or a conductor, in the tooth, we have placed the conditions there the same as when we lower into a cell a negative and a positive plate. That is the difference between electro-chemical action, or what I have said is secondary decay produced by fillings. It means just that you have present the conditions by which a current is generated, that goes to the dentine, and produces an acid and dissolves the lime-salts.

SECTION VI.—Continued.

Examination of Pre-Historic Crania.

FINAL REPORT BY JOHN J. R. PATRICK, CURATOR OF THE INVESTIGATION.

GENTLEMEN,—I have the honor to submit herewith the final report of the examination of human crania in the principal museums of the United States.

Allow me to quote from the previous report as follows: "The bound records are too cumbersome for publication in our Transactions, as some of the phenomena observed and provided for in the tables do not occur oftener than once in one thousand; yet provision had to be made for these on every page. Many valuable observations that could not be represented by symbols are recorded in the bound volumes under the head of 'Remarks,' provided for on each page of the records, and these remarks must find a fitting place and connection in the final record of the investigation in our Transactions.

"This condition of things necessitated the construction of additional tables to carry the observations made under the heads of remarks and the symbols on the diagrams of the original record.

"By this arrangement the necessity of using the diagrams in the records of our Association will be obviated, and the use of one page for each examination will be dispensed with. The publication of tables in our Transactions from year to year would encumber the volumes with many folding plates, and make the record of the investigations disconnected, and therefore unsatisfactory for a work of reference. I therefore respectfully recommend that the publication of tables, catalogue, and record numbers of the crania in the several collections in our museums be dispensed with in our annual reports, and a separate volume be published as an appendix to our Transac-

tions at the close of the investigation, a volume that will be a complete index to all the crania that have been examined."

That the work of examination has been conscientiously and well performed, the following names are sufficient guarantee:

For the Peabody Museum of Harvard University, Drs. R. R. Andrews, Jos. King Knight, and Mr. G. W. Newton (anatomist).

For the Army Medical Museum of Washington, D. C., Drs. H. B. Noble, Chas. B. Munson, O. D. Darrell.

For the Academy of Natural Sciences of Philadelphia, Drs. C. N. Peirce, J. E. Ives and brother.

For the Chicago Medical College, Drs. Louis Ottofy, John S. Marshall, L. L. Davis, J. O. Brown.

For the Davenport Academy of Science, Iowa, Drs. W. S. Hosford, Jos. R. Kulp, and R. S. Bandy.

For the Patrick Collection, now in the Museum of the Historical Society of St. Louis, Missouri, Drs. H. J. McKellops, A. H. Fuller, and J. W. Wick.

ABSTRACT OF ALL THE VOLUMES RECORDING THE CONDITION OF THE TEETH AND JAWS OF HUMAN CRANIA IN THE FOLLOWING MUSEUMS:

The Peabody Museum of Harvard University.

The Army Medical Museum, Washington, D. C.

The Collection of Dr. Samuel George Morton in the Academy of Natural Sciences, Philadelphia.

The Collection in the Davenport Academy of Science, Iowa.

The Collection in the Chicago Medical College, Illinois.

And a Collection obtained from an ancient burial mound near the great Cahokia Temple Mound in St. Clair County, Illinois, now in the Museum of the Missouri Historical Society in St. Louis.

PACIFIC.

INCLUDING SANDWICH ISLANDERS, AUSTRALIANS, NEW ZEALANDERS, AND TCHOOKABEES.

Superior Maxillæ.

Number of maxillæ examined	169
Number of decayed teeth observed	60
Number of decayed teeth on the right side	28
Number of decayed teeth on the left side	32
Inclusion of teeth	17
Diminution in number of teeth	57

Teeth lost ante-mortem	185
Teeth lost ante-mortem on the right side	91
Teeth lost ante-mortem on the left side	94
Teeth lost post-mortem	1093
Malposition of teeth	5
Supplemental teeth	2
Multiple tubercles	12
Teeth rotated	20
Horizontality of teeth	1
Cysts the result of alveolar abscesses	53
Perforated antrums	5
Roots of teeth convergent	3
Roots of teeth divergent	10
Prognathous	3
Orthognathous	31
Isognathous	12
Enamel of teeth grooved	2
Enamel of teeth pitted	4
Enamel of teeth granular	2
Salivary calculi	95

Inferior Maxillæ.

Number of maxillæ examined	111
Number of decayed teeth observed	58
Number of decayed teeth on the right side	26
Number of decayed teeth on the left side	32
Inclusion of teeth	13
Diminution in number of teeth	40
Teeth lost ante-mortem	114
Teeth lost ante-mortem on the right side	58
Teeth lost ante-mortem on the left side	56
Teeth lost post-mortem	522
Malposition of teeth	1
Supplemental teeth	1
Multiple tubercles	3
Teeth rotated	11
Cysts the result of alveolar abscesses	19
Horizontality of teeth	11
Constriction of maxilla	2
Enamel of teeth pitted	3
Salivary calculi	4

CENTRAL AMERICAN.

INCLUDING MEXICANS, GUATEMALIANS, AND NICARAGUANS.

Superior Maxillæ.

Number of maxillæ examined	77
Number of decayed teeth observed	27

Number of decayed teeth on the right side	13
Number of decayed teeth on the left side	14
Inclusion of teeth	3
Diminution in number of teeth	18
Teeth lost ante-mortem	146
Teeth lost ante-mortem on the right side	80
Teeth lost ante-mortem on the left side	66
Teeth lost post-mortem	644
Multiple tubercles	1
Aberrant teeth	1
Teeth rotated	4
Horizontality of teeth	2
Cysts the result of alveolar abscesses	26
Perforated antrums	2
Constricted maxilla	6
Roots of teeth divergent	1
Roots of teeth convergent	1
Prognathous	2
Orthognathous	11
Isognathous	11
Enamel of teeth grooved	12
Enamel of teeth pitted	25
Salivary calculi	15

Inferior Maxillæ.

Number of maxillæ examined	39
Number of decayed teeth observed	17
Number of decayed teeth on the right side	7
Number of decayed teeth on the left side	10
Inclusion of teeth	11
Diminution in the number of teeth	2
Teeth lost ante-mortem	60
Teeth lost ante-mortem on the right side	33
Teeth lost ante-mortem on the left side	27
Teeth lost post-mortem	248
Teeth rotated	4
Horizontality of teeth	6
Cysts the result of alveolar abscesses	8
Enamel of teeth pitted	4

SOUTH AMERICAN.

INCLUDING PERUVIANS, CHILIANS, TIERRA-DEL-FUEGIANS, AND GUANCHES.

Superior Maxillæ.

Number of maxillæ examined	683
Number of decayed teeth observed	314
Number of decayed teeth on the right side	154

Number of decayed teeth on the left side	160
Inclusion of teeth	141
Diminution in the number of teeth	146
Teeth lost ante-mortem	1727
Teeth lost ante-mortem on the right side	848
Teeth lost ante-mortem on the left side	879
Teeth lost post-mortem	5510
Malposition of teeth	18
Malposition by transposition	1
Supplemental teeth	14
Multiple tubercles	15
Aberrant teeth	2
Teeth rotated	33
Horizontality of teeth	21
Cysts the result of alveolar abscesses	467
Perforated antrums	39
Roots of teeth convergent	34
Roots of teeth divergent	46
Prognathous	14
Orthognathous	24
Isognathous	18
Hypertrophied alveolar border	1
Enamel of teeth pitted	48
Enamel of teeth grooved	28
Enamel of teeth granular	5
Crescentic enamel	15
Salivary calculi	100

Inferior Maxillæ.

Number of maxillæ examined	178
Number of decayed teeth observed	76
Number of teeth decayed on the right side	41
Number of teeth decayed on the left side	35
Inclusion of teeth	17
Diminution in number of teeth	22
Teeth lost ante-mortem	345
Teeth lost ante-mortem on the right side	164
Teeth lost ante-mortem on the left side	181
Teeth lost post-mortem	1248
Malposition of teeth	7
Teeth rotated	16
Horizontality of teeth	15
Cysts the result of alveolar abscesses	44
Roots of teeth convergent	7
Roots of teeth divergent	3
Hypertrophy of alveolar border	4
Enamel of teeth grooved	24
Enamel of teeth pitted	26

NORTH AMERICAN.

INCLUDING ESQUIMAUX, AND EXAMPLES EROM ALASKA, CALIFORNIA, MICHIGAN, OHIO, MASSACHUSETTS, KENTUCKY, IOWA, ILLINOIS, TENNESSEE, MISSISSIPPI, ARKANSAS, FLORIDA, AND OTHER STATES.

Superior Maxillæ.

Number of maxillæ examined	1399
Number of decayed teeth observed	692
Number of teeth decayed on the right side	347
Number of teeth decayed on the left side	345
Inclusion of teeth	115
Diminution in number of teeth	144
Teeth lost ante-mortem	2536
Teeth lost ante-mortem on the right side	1243
Teeth lost ante-mortem on the left side	1293
Teeth lost post-mortem	7538
Malposition of teeth	39
Malposition by transposition	2
Supplemental teeth	13
Multiple tubercles	64
Aberrant teeth	9
Teeth rotated	142
Horizontality of teeth	46
Cysts the result of alveolar abscesses	627
Perforated antrums	33
Constriction of maxillæ	2
Roots of teeth convergent	29
Roots of teeth divergent	332
Prognathous	34
Orthognathous	328
Isognathous	357
Hypertrophied alveolar border	229
Enamel of teeth grooved	377
Enamel of teeth pitted	461
Enamel of teeth granular	12
Crescentic enamel	25
Salivary calculi	792

Inferior Maxillæ.

Number of maxillæ examined	1099
Number of decayed teeth observed	702
Number of teeth decayed on the right side	337
Number of teeth decayed on the left side	365
Inclusion of teeth	83
Diminution in number of teeth	146
Teeth lost ante-mortem	1881
Teeth lost ante-mortem on the right side	953
Teeth lost ante-mortem on the left side	928

Teeth lost post-mortem	4580
Malposition of teeth	24
Malposition by transposition	1
Supplemental teeth	12
Multiple tubercles	21
Aberrant teeth	2
Teeth rotated	167
Horizontality of teeth	69
Cysts the result of alveolar abscesses	442
Roots of teeth convergent	37
Roots of teeth divergent	116
Hypertrophied alveolar border	133
Enamel of teeth grooved	260
Crescentic enamel	5
Enamel of teeth pitted	419
Salivary calculi	120

EUROPEAN.

INCLUDING GERMANS, FRENCH, ENGLISH, IRISH, SWEDES, GREEKS, ITALIANS, ANGLO-AMERICANS, AND A FEW MODERN SOLDIERS.

Superior Maxillæ.

Number of maxillæ examined	220
Number of decayed teeth observed	138
Number of decayed teeth on the right side	65
Number of decayed teeth on the left side	73
Inclusion of teeth	29
Diminution in number of teeth	44
Teeth lost ante-mortem	763
Teeth lost ante-mortem on the right side	385
Teeth lost ante-mortem on the left side	378
Teeth lost post-mortem	1308
Malposition of teeth	5
Supplemental teeth	1
Multiple tubercles	8
Teeth rotated	32
Horizontality of teeth	2
Cysts the result of alveolar abscesses	120
Perforated antrums	2
Roots of teeth convergent	2
Roots of teeth divergent	8
Prognathous	10
Orthognathous	41
Isognathous	37
Hypertrophy of alveolar border	8
Crescentic enamel	11
Enamel of teeth pitted	13
Salivary calculi	52

Inferior Maxillæ.

Number of maxillæ examined	145
Number of decayed teeth observed	103
Number of decayed teeth on the right side	54
Number of decayed teeth on the left side	49
Inclusion of teeth	10
Diminution in number of teeth	45
Teeth lost ante-mortem	369
Teeth lost ante-mortem on the right side	180
Teeth lost ante-mortem on the left side	189
Teeth lost post-mortem	982
Malposition of teeth	7
Multiple tubercles	1
Aberrant teeth	1
Teeth rotated	74
Horizontality of teeth	23
Cysts the result of alveolar abscesses	51
Enamel of teeth grooved	2
Enamel of teeth pitted	2
Crescentic enamel	7
Salivary calculi	6

EGYPTIAN AND AFRICAN.

Superior Maxillæ.

Number of maxillæ examined	229
Number of decayed teeth observed	74
Number of decayed teeth on the right side	39
Number of decayed teeth on the left side	35
Inclusion of teeth	68
Diminution in number of teeth	43
Teeth lost ante-mortem	436
Teeth lost ante-mortem on the right side	215
Teeth lost ante-mortem on the left side	221
Teeth lost post-mortem	1416
Malposition of teeth	3
Malposition by transposition	1
Supplemental teeth	2
Multiple tubercles	7
Teeth rotated	1
Horizontality of teeth	11
Cysts the result of alveolar abscesses	63
Perforated antrums	1
Constriction of maxillæ	1
Prognathous	18
Orthognathous	44
Isognathous	14

Hypertrophy of alveolar border	3
Enamel of teeth grooved	10
Crescentic enamel	10
Enamel of teeth pitted	19
Salivary calculi	61

Inferior Maxillæ.

Number of maxillæ examined	94
Number of decayed teeth observed	39
Number of decayed teeth on the right side	18
Number of decayed teeth on the left side	21
Inclusion of teeth	15
Diminution in number of teeth	8
Teeth lost ante-mortem	140
Teeth lost ante-mortem on the right side	80
Teeth lost ante-mortem on the left side	60
Teeth lost post-mortem	312
Malposition of teeth	1
Multiple tubercles	4
Teeth rotated	2
Horizontality of teeth	2
Cysts the result of alveolar abscesses	13
Roots of teeth divergent	4
Enamel of teeth grooved	11
Enamel of teeth pitted	12
Crescentic enamel	6

ASIATIC.

INCLUDING MALAYS, CHINESE, JAPANESE, ARMENIANS, HINDOOS, AND BURMESE.

Superior Maxillæ.

Number of maxillæ examined	124
Number of decayed teeth observed	22
Number of decayed teeth on the right side	13
Number of decayed teeth on the left side	9
Inclusion of teeth	31
Diminution in number of teeth	18
Teeth lost ante-mortem	211
Teeth lost ante-mortem on the right side	108
Teeth lost ante-mortem on the left side	103
Teeth lost post-mortem	651
Malposition of teeth	7
Multiple tubercles	5
Aberrant teeth	2
Teeth rotated	5
Horizontality of teeth	4
Cysts the result of alveolar abscesses	21

Roots of teeth convergent	3
Roots of teeth divergent	10
Prognathous	14
Orthognathous	35
Isognathous	11
Hypertrophy of alveolar border	2
Enamel of tooth grooved	1
Crescentic enamel	33
Enamel of teeth pitted	3
Enamel of teeth granular	1
Salivary calculi	77

Inferior Maxillæ.

Number of maxillæ examined	80
Number of decayed teeth observed	23
Number of decayed teeth on the right side	13
Number of decayed teeth on the left side	10
Inclusion of teeth	7
Diminution of teeth	19
Teeth lost ante-mortem	80
Teeth lost ante-mortem on the right side	43
Teeth lost ante-mortem on the left side	37
Teeth lost post-mortem	358
Malposition of teeth	23
Multiple tubercles	1
Teeth rotated	8
Horizontality of teeth	2
Cysts the result of alveolar abscesses	3
Constriction of maxilla	1
Crescentic enamel	5

TOTAL NUMBER OF UPPER AND LOWER TEETH EXAMINED, AND THE PERCENTAGE OF DISEASE IN EACH.

SOUTH AMERICANS.

Total number of teeth examined	6719
Total number of teeth diseased	2462
Total percentage of diseased teeth	36⅔

Total Number of Upper Teeth Examined.

Number of teeth examined	5158
Number of teeth diseased	2041
Percentage of diseased teeth	39½

Total Number of Lower Teeth Examined.

Number of teeth examined	1561
Number of teeth diseased	421
Percentage of diseased teeth	27

Total Number of Teeth Diseased on the Right and on the Left.

Number of upper right teeth diseased	1002
Number of upper left teeth diseased	1039
Excess in percentage of the left over the right	3½
Number of lower right teeth diseased	222
Number of lower left teeth diseased	199
Excess in percentage of the right over the left	11½

CENTRAL AMERICANS.

Total number of teeth examined	930
Total number of teeth diseased	250
Total percentage of diseased teeth	26⅘

Total Number of Upper Teeth Examined.

Number of teeth examined	567
Number of teeth diseased	173
Percentage of teeth diseased	30½

Total Number of Lower Teeth Examined.

Number of teeth examined	363
Number of teeth diseased	77
Percentage of diseased teeth	21⅗

Total Number of Teeth Diseased on the Right and on the Left.

Number of upper right teeth diseased	93
Number of upper left teeth diseased	80
Excess in percentage of the right over the left	16¼
Number of lower right teeth diseased	40
Number of lower left teeth diseased	37
Excess in percentage of the right over the left	12⅓

NORTH AMERICANS.

Total number of teeth examined	27,362
Total number of teeth diseased	5811
Total percentage of diseased teeth	21⅕

Total Number of Upper Teeth Examined.

Number of teeth examined	14,587
Number of teeth diseased	3228
Percentage of teeth diseased	22

Total Number of Lower Teeth Examined.

Number of teeth examined	12,775
Number of teeth diseased	2583
Percentage of teeth diseased	20⅕

Total Number of Teeth Diseased on the Right and on the Left.

Number of upper right teeth diseased	1590
Number of upper left teeth diseased	1638
Excess in percentage of the left over the right	.03
Number of lower right teeth diseased	1290
Number of lower left teeth diseased	1293
Excess in percentage of the left over the right	.002½

EUROPEAN.

Total number of teeth examined	3422
Total number of teeth diseased	1373
Total percentage of diseased teeth	40⅛

Total Number of Upper Teeth Examined.

Number of teeth examined	2139
Number of teeth diseased	901
Percentage of teeth diseased	42

Total Number of Lower Teeth Examined.

Number of teeth examined	1283
Number of teeth diseased	472
Percentage of diseased teeth	36⅘

Total Number of Teeth Diseased on the Right and on the Left.

Number of upper right teeth diseased	450
Number of upper left teeth diseased	451
Excess in percentage of the left over the right	.0022
Number of lower right teeth diseased	234
Number of lower left teeth diseased	238
Excess in percentage of the left over the right	.009

PACIFIC AND SANDWICH ISLANDERS.

Total number of teeth examined	2738
Total number of teeth diseased	417
Total percentage of teeth diseased	15¼

Total Number of Upper Teeth Examined.

Number of teeth examined	1537
Number of teeth diseased	245
Percentage of diseased teeth	16

Total Number of Lower Teeth Examined.

Number of teeth examined	1201
Number of teeth diseased	172
Percentage of diseased teeth	14⅓

Total Number of Diseased Teeth on the Right and on the Left.

Number of upper right teeth diseased	119
Number of upper left teeth diseased	126

Excess in percentage of the left over the right 5½
Number of lower right teeth diseased 84
Number of lower left teeth diseased 88
Excess in percentage of the left over the right ..... .045¼

EGYPTIANS.

Total number of teeth examined 3306
Total number of teeth diseased 689
Total percentage of diseased teeth 20⅘

Total Number of Upper Teeth Examined.

Number of teeth examined 2137
Number of teeth diseased 510
Percentage of teeth diseased 23⅘

Total Number of Lower Teeth Examined.

Number of teeth examined 1169
Number of teeth diseased 179
Percentage of teeth diseased 15⅓

Total Number of Teeth Diseased on the Right and on the Left.

Number of upper right teeth diseased 254
Number of upper left teeth diseased 256
Excess in percentage of the left over the right ..... .008
Number of lower right teeth diseased 98
Number of lower left teeth diseased 81
Excess in percentage of the right over the left ..... .21

ASIATICS.

Total number of teeth examined 2180
Total number of teeth diseased 336
Total percentage of diseased teeth 15⅖

Total Number of Upper Teeth Examined.

Number of teeth examined 1284
Number of teeth diseased 233
Percentage of diseased teeth 18

Total Number of Lower Teeth Examined.

Number of teeth examined 896
Number of teeth diseased 103
Percentage of diseased teeth 11½

Total Number of Teeth Diseased on the Right and on the Left.

Number of upper right teeth diseased 121
Number of upper left teeth diseased 112
Excess in percentage of the right over the left ..... .008
Number of lower right teeth diseased 56
Number of lower left teeth diseased 47
Excess in percentage of the right over the left ..... .19

GRAND TOTAL.

Total number of teeth examined	46,017
Total number of teeth diseased	11,338
Total percentage of diseased teeth	24⅔

Total Number of Upper Teeth Examined.

Number of teeth examined	28,369
Number of teeth diseased	7331
Percentage of teeth diseased	25⅘

Total Number of Lower Teeth Examined.

Number of teeth examined	17,648
Number of teeth diseased	4007
Percentage of diseased teeth	22⅘

Total Number of Teeth Diseased on the Right and on the Left.

Number of upper right teeth diseased	3662
Number of upper left teeth diseased	3669
Excess in percentage of the left over the right	.002
Number of lower right teeth diseased	2024
Number of lower left teeth diseased	1983
Excess in percentage of the right over the left	.0207

AVERAGES OF MEASUREMENTS FOR WIDTH OF ARCH AND DEPTH OF PALATE.*

The measurements for width of arch and depth of palate have been confined to the collection of human crania contained in the Peabody Museum at Harvard University, with the exception of forty-two obtained from a burial mound near the great Cahokia Temple Mound in St. Clair County, Illinois, and now forming a part of the Patrick Collection of Indian relics in the museum of the Missouri Historical Society in St. Louis, Mo.

* The measurements are made in inches, afterward converted into millimeters, sometimes by the examiner, but mostly by myself, especially in the later examinations. I have used no fractions of millimeters, hence these are mostly approximations, while the measurements in inches are supposed to be correct or nearly so; at least to $\frac{1}{64}$ of an inch in the first and to $\frac{1}{32}$ of an inch in the later examinations.

25	millimeters	1	inch.
35	"	1.4	inches.
36	"	1.44	"
37	"	1.48	"
38	"	1.52	"

So that a measurement between 1.4 and 1.44 inches would be 35 or 36 millimeters. A measurement between 1.48 and 1.52 inches would be 37 or 38 millimeters, as the inches are nearer 1.48 or 1.52.

Total measured for width of arch, 578. Total measured for depth of palate, 490.

The average width of arch in these 578 is 36 millimeters, or 1.4217 inches. The average depth of palate in 490 crania is 25 millimeters, or 1.0019 inches.

These totals are grouped by races and nationalities as follows:

	Millimeters.	Inches.
North American Indians.		
Width of arch, 340 measured	37	1.4775
Depth of palate, 269 measured	28	1.0658
Ohio Mound Builders.		
Width of arch, 6 measured	38	1.5322
Depth of palate, 4 measured	28	1.1406
Pahute Indians (Utah).		
Width of arch, 1 measured	37	1.5
Depth of palate, 1 measured	27	1.0625
Pacific Coast Indians.		
Width of arch, 5 measured	38	1.55
Depth of palate, 5 measured	27	1.11
Sandwich Islanders (Hawaiian).		
Width of arch, 63 measured	37	1.4712
Depth of palate, 58 measured	27	1.0528
Unknown.		
Width of arch, 6 measured	37	1.479
Depth of palate, 5 measured	27	1.0625
French (Parisian).		
Width of arch, 12 measured	36	1.448
Depth of palate, 11 measured	28	1.1477
Aleutians (Behring Sea).		
Width of arch, 2 measured	39	1.5625
Depth of palate, 2 measured	29	1.1875
Southern Europeans (mostly Italian).		
Width of arch, 71 measured	36	1.4428
Depth of palate, 67 measured	28	1.153
Mexicans.		
Width of arch, 12 measured	32	1.2864
Depth of palate, 8 measured	27	1.0937
Africans.		
Width of arch, 18 measured	36	1.432
Depth of palate, 18 measured	27	1.063

AMERICAN INDIANS, FROM CAHOKIA MOUND, ILLINOIS.

	MILLIMETERS.	INCHES
Width of arch, 42 measured	39	1.5595
Depth of palate, 42 measured	15	0.5921

In the above are included 26 children's skulls measured in width of arch, and 21 for depth of palate.

Width of arch, 26 measured	36	1.4278
Depth of palate, 21 measured	21	.8305

These children are of races and nationalities as follows :

ITALIANS.

Width of arch, 3 measured	31	1.25
Depth of palate, 3 measured	18	.73

TENNESSEE INDIANS.

Width of arch, 9 measured	36	1.437
Depth of palate, 7 measured	22	.89

MEXICAN.

Width of arch, 1 measured	32	1.375
Depth of palate, 1 measured	19	.75

HINDOO.

Width of arch, 1 measured	23	.9375

CALIFORNIAN.

Width of arch, 1 measured	36	1.4375
Depth of palate, 1 measured	2	.0625

SANDWICH ISLANDERS.

Width of arch, 2 measured	34	1.375
Depth of palate, 2 measured	25	1.

MISCELLANEOUS AMERICANS.

Width of arch, 5 measured	34	1.375
Depth of palate, 4 measured	25	.9687

KENTUCKIANS.

Width of arch, 2 measured	35	1.4062

Subtracting these children and their measurements from the above totals of children and adults together, 578 and 490, we have for this report a total of adults 552, measuring in width of arch, in average 37 millimeters, or 1.421 inches, and of 469 averaging in depth of palate 25 millimeters, or 1.0092 inches, instead of 1.4217 and 1.0019 inches as in first totals of adults and children averaged together. My first report contains the two dimensions (width of arch and depth

of palate) averaged for adults numbering 569 and 507 ; adding these to the total of adults reported herein, 552 and 469, we have an aggregate contained in the two reports of 1121 adults, averaging in width of arch 32 millimeters, or 1.2901 inches, and of 976 adults in both reports, averaging in depth of palate 26 millimeters, or 1.0259 inches.

The five children in first report averaged separately as Peruvians, Mexicans, and a Californian, present for all five an average for width of arch of 32½ millimeters, or 1.307 inches, and for depth of palate 25 millimeters, or .994 inch.

One of the 26 children in this report, a Tennesseean, shows an abnormal width of arch, 1⅝ inches, or 41 millimeters. Subtracting this from the total and averaging the remaining 25 we have for this remainder, instead of 1.4278 inches, or 36 millimeters as above, for width of arch, an average of 35 millimeters, or 1.4192 inches.

The depth of palate is normal, one inch, and about the average depth in children. The average width of arch in adults and that in children show very little difference.

NOTES ON ANOMALIES—PEABODY MUSEUM.

Vol. I, pages 8, 17, 29. There are ten cases of crescentic enamel.

Vol. I, page 14. Confusion of the left superior second bicuspid, and first molar.

Vol. II, page 14. Diastema in region of the superior cuspids and bicuspids.

Vol. II, page 16. Diminution of superior right and left third molars and the central incisors.

Vol. II, page 41. Diastema in region of superior right and left cuspids.

Vol. II, page 60. Diastema in region of inferior cuspids and bicuspids.

Vol. III, page 32. A remarkably formed superior maxilla, the tuberosities of the process approximating, the arch forming almost three-fourths of a circle.

Vol. III, page 28. Malposition by transposition. The right superior cuspid is between the first and second bicuspids in line, and the left cuspid is crowded out of place by a supplemental tooth.

Vol. III, page 66. The right cuspid is included in the palate, the crown directed inward and forward behind the lateral incisor.

Vol. III, page 96. Deciduous teeth of a child, decayed.

Vol. IV, page 55. The right cuspid is included, its crown directed to the posterior as far back as the second bicuspid; the third right molar is also included, its crown directed to the posterior, and the crown of the left third molar is directed to the posterior, but not included.

Vol. IV, page 65. Nanism. The right cuspid is very small, much smaller than the left.

Vol. IV, page 83. Two supplemental teeth, the left one in alignment and the right one included below the central and lateral incisors; they have

caused the teeth to move from the left to the right side, producing asymmetry of the arch, the left first molar being opposite the right second bicuspid.

Vol. IV, page 94. One left supplemental lateral incisor.

Vol. V, page 6. A very small skull, supposed to be a dwarf. The measurements of the arch are not proportionately small. Width of palate 37 millimeters, depth of palate 21 millimeters.

Vol. V, page 55. Diastema between superior left cuspid and lateral incisor.

Vol. V, page 79. Diminution of the four superior incisors, and the third right molar included beneath the second molar.

Vol. V, page 77. The left superior cuspid is horizontal; its crown is directed to the posterior, and rests directly above the first molar beneath the projection of the malar process.

Vol. V, page 81. Geantism. The first superior molars are very large, the crown of one being 12 millimeters square.

Vol. V, page 94. The right superior cuspid is directed forward, the crown appearing above the central incisor at the nasal process.

Vol. VI, page 11. Inferior right cuspid and bicuspid are horizontal, their crowns directed toward the median line, and are imbricated.

Vol. VI, page 19. The lower incisors imbricated.

Vol. VI, page 52. The two upper and the two lower central incisors never present.

Vol. VI, page 95. The remains of deciduous teeth present.

Vol. VII, page 14. An enamel nodule on the cervical borders of the right third superior molar.

Vol. VII, page 18. Enamel nodules on the cervical borders of the superior third molars.

Vol. VII, page 31. Enamel nodule on the cervical border of the right first bicuspid.

Vol. VII, page 48. The left superior central incisor has doubled up upon itself, the crown directed upward, presenting its posterior surface to the anterior, its crown coming out between the nasal and the alveolar process.

Vol. VII, page 50. The superior maxilla has ten cysts, the inferior five, the result of alveolar abscesses; the teeth all present with the exception of four; they are badly worn and necrosed. It will be observed that the percentage of decayed teeth in the California Indians is much less than in the Peruvians, but the ravages of alveolar abscesses leaving cysts in the process are greater in the Californians. The difference in the character of the diseased teeth in the two races is easily accounted for if we consider their environment; the Californian being confined to the sea-coast, large quantities of siliceous material were ever present in his food, which produced the worn condition of his teeth, the destruction of their pulps, and final necrosis.

Vol. VII, page 53. The two deciduous inferior right lateral and central incisors fused together.

Vol. VII, page 70. One deciduous molar present in adult, much worn, and no sign of its successor.

Vol. VIII, page 17. Diastema on the left side between the inferior bicuspids.

Vol. VIII, page 9. The inferior left deciduous molar present, and no indications of its successor (adult).

Vol. VIII, page 36. The upper and lower teeth in good condition, and all present with but one decayed in the lower maxilla.

Vol. IX, page 3. Caries on external cervical border of third molars.

Vol. IX, page 9. This cranium has an unusually fine set of teeth.

Vol. IX, page 18. The jaw is nodular on the right side.

Vol. IX, page 20. Shows caries on external cervical border of left cuspid.

Vol. IX, page 22. A fine set of teeth.

Vol. IX, page 24. A confusion of inferior right lateral incisor with the cuspid.

Vol. IX, page 31. A rather strange case. A large cavity in the jaw, including process of right superior first and second molars. In the bottom of the cavity is a small molar; its roots go so nearly through the jaw that a little nodule on the under and inner side indicates its position.

Vol. IX, page 51. There is an imbrication of three succedaneous teeth.

Vol. IX, page 60. The third superior right molar has four roots.

Vol. IX, page 69. Upper jaw is nodular on the outer wall of process.

Vol. IX, page 71. The inferior right bicuspids have imbedded their crowns into each other, but are not confused.

Vol. X, page 29. Hypertrophy of alveolar border on both sides, and more or less nodular.

Vol. X, page 37. Imbrication of one succedaneous tooth.

Vol. X, page 43. Diastema between superior right incisor and lateral.

Vol. X, page 66. Two supernumerary teeth included inside the arch, and one outside not included, on the opposite side.

Vol. X, page 79. One supernumerary tooth included.

Vol. X, page 94. One supernumerary tooth included inside the arch.

Vol. XI, page 1. No indications that permanent incisors have ever been present.

Vol. XI, page 13. Supernumerary tooth between right cuspid and bicuspid decayed.

Vol. XI, page 14. Border of process from left cuspid to third molar more or less nodular.

Vol. XI, page 23. A perfect set of teeth, upper and lower.

Vol. XI, page 38. Supernumerary tooth between right lateral incisor and cuspid; crown of first bicuspid is out of alignment.

Vol XI, page 43. At the site of the right and left bicuspids the temporary molars are still present and no indications of bicuspids, although the rest of the teeth are fully developed.

Vol. XI, page 95. The floor of the nose cavities, the upper part being broken, shows the presence of two teeth lying nearly horizontal.

Vol. XI, page 98. The left bicuspids stand side by side, and each revolved nearly ninety degrees on its axis.

Vol. XII, page 17. Left third molar has a large enamel nodule on the inner root.

Vol. XII, page 28. Each of the third molars of the lower jaw are multicuspid. (Geantism.)

Vol. XII, page 51. One diastema on the right and one on the left, between the two bicuspids.

Vol. XII, page 66. Has a diastema between the right bicuspids.

Vol. XII, page 78. The right upper bicuspids are arranged nearly side by side, and each has rotated ninety degrees. The second bicuspid stands on the inner side.

Vol. XIII, page 5. Inferior right third molar has a small enamel nodule on external cervical border.

Vol. XIII, page 9. Diastema between left lateral incisor and cuspid.

Vol. XIII, page 13. A very large cavity at right superior molar, which extends ⅛ inch long through the jaw from side to side, and is ⅛ inch in depth.

Vol. XIII, page 27. Superior left first bicuspid small; the process is not more than half as large and deep as second bicuspid. The supernumerary tooth just inside of process of first bicuspid is an aberrant dwarf.

Vol. XIII, page 28. The supernumerary tooth is an aberrant dwarf, and has a round crown.

Vol. XIII, page 37. Imbrication of one succedaneous tooth.

Vol. XIII, page 76. The supernumerary tooth between the left bicuspids is an aberrant dwarf, and the one between the right bicuspids is the same.

Vol. XIV, page 58. Inferior left bicuspid rotated, apparently not due to crowding.

Vol. XIV, page 81. The process at the site of right second bicuspid is small and shallow, indicating that a deciduous tooth had remained. There are three more processes between the site of the deciduous tooth and the first molar, but the next process shows a double root, thus indicating the position of the first bicuspid; following this there are two more regular processes before the first molar. Thus the indications are a dwarf cuspid (Nanism), and a supernumerary tooth between the first bicuspid and first molar.

Vol. XIV, page 82. No indications of third molars.

Vol. XV, page 48. Both third molars are horizontal; the right molar seems to have started to grow up perpendicular and then bent over at right angles, the crown pointing inward. All remaining teeth are very badly worn.

Vol. XV, page 80. The necks of superior lateral incisors have been worn into or eroded, a groove is nearly half-way through on the right lateral, and is deepest on the outside. The inside of the left central is in like condition.

Vol. XV, page 68. Has a diastema between the right bicuspids.

Vol. XV, page 70. Large cyst the remains of abscess including the third molars on the left side, extending five-eighths of an inch into the jaw.

Vol. XV, page 87. On the interior of each side opposite the bicuspids is a large nodule about one-half inch in diameter.

Vol. XVI, page 1. A supplemental tooth between lateral and central incisors has not erupted.

Vol. XVI, page 23. Lower jaw extends beyond upper.

Vol. XVI, page 27. A beautiful set of teeth.

Vol. XVI, page 31. A supernumerary tooth is behind the inner root of right upper third molar, and has been exposed by a slight break in the jaw.

Vol. XVI, page 33. Diminution of the right and left first bicuspids.

Vol. XVI, page 36. A dwarf. Skull is very small, having a capacity of only 400 cubic centimeters. Some of the large skulls handled have been marked as high as 1400 to 1500 cubic centimeters. Arch of upper jaw compares favorably in size with an ordinary jaw. The teeth are average in size. Lower jaw considerably shorter than the upper.

Vol. XVI, page 37. Hypertrophy of alveolar border on both sides in the region of the six molars.

Vol. XVI, page 39. Both superior first molars are inclined inward. Crowns nearly worn off on some of the teeth.

Vol. XVI, page 45. Temporary molars (right superior) have been lost post-mortem. The left temporary molar present, and no sign of the bicuspids. The upper right third molar not fully developed, and there are no indications of third molars in lower jaw.

Vol. XVI, page 58. Diminution of inferior left lateral incisor.

Vol. XVI, page 60. Superior left second bicuspid rotated and not crowded.

Vol. XVI, page 66. Diminution of superior right second bicuspid.

Vol. XVI, page 81. Diastema between right cuspid and bicuspid, and between left lateral incisor and cuspid.

Vol. XVI, page 86. Two diminutions; one being the right lateral incisor, the other the right second bicuspid.

Vol. XVII, page 38. Both superior third molars inclined inward.

Vol. XVII, page 44. Superior right second bicuspid rotated.

Vol. XVII, page 46. Right lateral and both central incisors have grooves on the outer surface of crown about one-eighth of an inch from cutting-edge; in the right central the groove extends about half-way through the tooth and looks as though it had been filed.

Vol. XVII, page 70. Diminution of right and left superior first bicuspids.

Vol. XVII, page 76. Diastema between superior right cuspid and first bicuspid.

Vol. XVII, page 88. Diastema between superior left first and second bicuspids.

Vol. XVII, page 89. Superior right second molar is a case of Geantism.

Vol. XVIII, page 4. Superior third molar is a dwarf, half natural size. (Nanism.)

Vol. XVIII, page 21. The corner of the crown of the included superior right third molar is under the posterior root of second molar.

Vol. XVIII, page 30. The superior third molars have small enamel tubercles on the cervical borders.

Vol. XVIII, page 42. From the appearance of the process, the left cuspid must have been imbedded obliquely across the process of the lateral incisor.

Vol. XVIII, page 44. The corner of the crown of the lower right third molar (which is included and horizontal) has been exposed by the absorption of the jaw in that region.

Vol. XVIII, page 68. Crown of superior left lateral incisor is crowded inward.

Vol. XVIII, page 70. An unusually perfect set of teeth.

Vol. XVIII, page 71. Both inferior third molars are inclined inward about forty-five degrees, and the superior left central and lateral incisors are rotated and imbricated.

NOTE.—There is a suture down the middle of the frontal bone in about ten per cent. of the Italians. In other groups examined the open suture is a rare thing.

Since the work at the Peabody Museum was completed, and the volumes of record returned to me, I have received, through the kindness of Dr. Andrews, photographs and descriptive text of a very remarkable pre-historic skull and a number of teeth from Central America.

The skull and teeth were brought to Cambridge by an expedition which was sent by the Peabody Museum of Harvard University to Central America in 1891. Fig. 1 is a photograph of the skull found at Labna, which shows the teeth filed in a peculiar manner.

The third molars and the left cuspid were just erupting during the life of the subject, which would indicate its age; the left cuspid is out of alignment within the arch about a quarter of an inch, and is not seen in the plate; the teeth are free from decay. The same expedition found at Copan, Honduras, a number of very ancient graves, which contained mere fragments of human skeletons, and these fragments were very friable. Many of the teeth were recognized by the enamel only. In a few cases the teeth were ornamented with inlays of green jade on their front surfaces and beautifully polished; others filed in a peculiar manner, and some decayed. A most interesting find was a left lower incisor carved from a dark stone which had been implanted in the place of one which had been lost; the tartar upon the stone substitute is evidence that it had been worn during life. (See Figs. 2 and 3.)

DAVENPORT ACADEMY OF SCIENCE, IOWA.

Vol. I, page 2. Teeth are abraded down to pulp-chamber in cuspids and bicuspids; the canals are closed up by secondary dentine.

Vol. I, page 3. Abrasion of all teeth present, and pulp-chambers exposed.

Vol. I, page 4. Grinding-surfaces of all the teeth worn down one-third of the crowns.

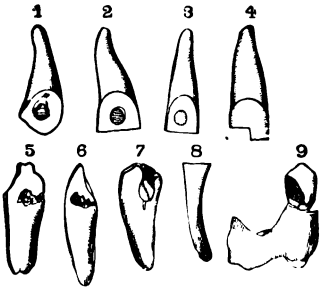
Vol. I, page 5. Pulp exposed in second and third left inferior molars; and the process very thin on buccal and labial surfaces.

Vol. I, page 8. The roots of the left cuspid and first bicuspid are fused together. The palate bones show a cleft on the left side.

FIG. 1.

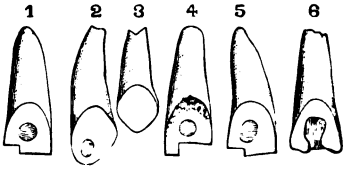
Pre-historic Skull found at Labna, Central America.

FIG. 2.



1, 2, inlay lost (probably lost), filled with a red cement. 3, beautiful green jade inlay. 4, filed; no inlay. 5, 6, 7, 9, decayed. 8, stone tooth, left lower incisor.

FIG. 3.



1, inlay missing; filed. 2, inlay near cutting-edge. 4, 5, inlaid with jade; filed. 6, inlay missing; broken through to cutting-edge.

Vol. I, page 10. Process gone in region of first right and second left molars on buccal surfaces, consequent upon the accumulation of tartar.

Vol. I, page 18. Enamel deeply cupped on anterior teeth.

Vol. I, page 22. Right first molar decayed at cervical margin.

Vol. I, page 24. Very deep fissures in molars (coronal surface).

Vol. I, page 47. Cleft palate.

Vol. I, page 49. Phagedenic pericementitis on the six anterior teeth.

Vol. I, page 52. Lower jaw fractured, and united ante-mortem.

Vol. I, page 53. First left bicuspid has three root-canals.

Vol. I, page 57. Left cuspid has phagedenic pericementitis on labial surfaces.

Vol. I, page 66. Confusion of the two inferior central incisors.

Vol. I, page 68. Lower jaw broken away ante-mortem in region of the third left molars.

Vol. I, page 72. Upper second right molar has pulp-chamber exposed.

Vol. I, page 77. The process, both on palatal and buccal surfaces, in the region of the first and second left molars gone.

Vol. I, page 83. Diastema between lower left bicuspids.

Vol. I, page 98. Lower left cuspid is bicusped, so there are three bicuspids on the left side.

COLLECTION OF ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

Vol. I, page 8. Molar deficient ante-mortem; asymmetry of the jaw to the right.

Vol. I, page 87. Partial division of the crowns of superior central incisors.

Vol. II, page 11. Partial division of the crowns of superior second bicuspid and first molar.

Vol. II, page 15. Superior left cuspid between central and lateral incisors.

Vol. II, page 48. Both inferior lateral incisors inside of alignment.

Vol II, page 88. Superior right first molar below the level of the other teeth.

Vol. IV, page 85. Diastema at the superior right second bicuspid and first molar.

Vol. IV, pages 94 and 99. Perfect.

Vol. V, page 37. Cuspids imbedded in the jaw.

Vol. V, page 50. Diminution of the lower central incisors.

Vol. V, page 72. Superior only, and perfect.

Vol. VII, page 58. The intermaxillaries in this skull are vertically deficient.

Vol. VII, page 60. Superior left central included.

Vol. VIII, page 21. Portion of the lower jaw containing the first right and left bicuspids elevated, so that the cervical border of the bicuspids is on a level with the crowns of the rest of the teeth.

Vol. VIII, page 55. Intermaxillary imperfectly developed.

Vol. VIII, page 56. Supernumerary tooth is badly eroded.

Vol. VIII, page 72. Very large cyst on the anterior left portion of the palate.

Vol. VIII, page 83. Asymmetry of the jaw.

Vol. IX, page 10. Upper and lower jaws perfect.

Vol. IX, page 26. A fourth molar is appearing behind the third molars, on either side of the superior jaw, and one supernumerary tooth on the lower right side between the bicuspids.

Vol. IX, page 40. Right third molar is rudimentary.

Vol. IX, page 90. Confusion of the second and third left molars.

ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

Vol. I, page 3. Diastema between first and second, right and left superior bicuspids. Lower left first molar, partial division of crown.

Vol. I, page 4. The roots of the upper right second molars are fused.

Vol. I, page 5. Diastema between the right bicuspids. Alveolar arch badly handled.

Vol. I, page 12. Several teeth broken and enamel chipped.

Vol. I, page 14. Partial division of superior right third molar. An unusual arch, diverging at the third molars, which are very large.

Vol. I, page 26. Crowns of superior right and left first molars partially divided, also right and left lower second molars.

Vol. I, page 29. The superior right third molar very large and round, with a projecting center. Confusion of the superior central incisors ; partial division of the crowns in three of the third molars ; the upper right third molar diminuted.

Vol. I, page 31. A superior cuspid is a small tooth and does not belong to this subject, and the left lateral incisor is evidently a misplaced tooth.

Vol. I, page 32. Well-shaped but prominent teeth. Diastema between superior left lateral and cuspid and lower left bicuspids.

Vol. I, page 34. In the lower jaw there is à bicuspid in the place of left cuspid, which does not belong to the series.

Vol. I, page 36. Remarkably well-developed jaw. Very perfect articulation. The decayed bicuspids a marked peculiarity.

Vol. I, page 42. The teeth of crania are badly mixed. Teeth put in any kind of position ; a bicuspid in third molar socket, a bicuspid for a central, etc.

Vol. I, page 57. Lower jaw does not belong to the upper, and the lower teeth are of an older person.

Vol. I, page 58. Perfect set of teeth.

Vol. I, page 61. A number of teeth inserted where they do not belong.

Vol. I, page 72. Perfect specimen.

Vol. I, page 73. Lower jaw does not belong to this cranium.

Vol. I, page 82. Lower jaw evidently does not belong to specimen.

Vol. I, page 85. Very large inferior central incisors, and second molar has been transposed or changed.

Vol. I, page 87. The left inferior incisor not as large as the right. A very broad arch.

Vol. I, page 94. Very perfect jaw and teeth; superior left lateral incisor has partial division of the crown.

Vol. II, page 8. Several teeth have been misplaced or exchanged.

Vol. II, page 21. The superior lateral incisors resemble a peg. Both upper and lower incisors are very small. The inferior third molars are well developed.

Vol. II, page 23. Fine specimen, roughly handled.

Vol. II, page 25. Teeth in lower jaw worn down into pulp, and all of them abscessed with the exception of one.

Vol. II, page 40. Lower jaw does not belong to skull, and teeth have been exchanged.

Vol. II, page 44. Teeth very nearly worn into pulp-cavity. Diastema between the superior central incisors.

Vol. II, page 56. Small round incisors. Specimen very old.

Vol. II, page 71. Superior lateral incisor has partial division of the crown.

Vol. II, page 61. Very old and badly worn specimen. Diastema between the superior central incisors.

Vol. II, page 75. Lower centrals have been changed.

Vol. II, page 77. Several teeth in wrong position.

Vol. II, page 85. Very small round incisors. Teeth badly worn.

Vol. II, page 89. Some of the few teeth left are misplaced.

Vol. II, page 92. Several teeth put in that do not belong to skull. One diastema between the central incisors.

Vol. II, page 95. Diminution of the first right superior bicuspid; and is an old upper, but a young lower jaw.

Vol. III, page 11. Upper teeth all lost and some lower misplaced.

Vol. III, page 18. Teeth worn into pulp.

Vol. III, page 22. Peculiar small round teeth.

Vol. III, page 26. The lateral incisors placed where the centrals should be.

Vol. III, page 41. Diastema between superior central incisors.

Vol. III, page 42. Set covered with a black substance. Diastema between superior second bicuspid and first molar.

Vol. III, page 52. Teeth blackened and filed.

Vol. III, page 65. Imbrication of succedaneous teeth; two superior temporary molars, no second bicuspids. Superior left third molar resembles a bicuspid.

Vol. III, page 70. Diminution of the superior left cuspid.

Vol. III, page 75. Inferior incisors very small.

Vol. III, page 80. Remarkable development of enamel of lower right first bicuspid.

Vol. IV, page 1. Very perfect.

Vol. IV, page 46. Several teeth put in wrong places.

Vol. IV, page 55. Front teeth filed and black.

Vol. IV, page 56. Upper teeth filed.

Vol. IV, page 59. Perfect teeth, both in size and shape.

CHICAGO MEDICAL COLLEGE, CHICAGO, ILLINOIS.

Vol. I, page 63. The remaining teeth in lower maxilla are abraded one-half their length.

Vol. I, page 68. Teeth all sound; three lost post-mortem.

Vol. I, page 69. Diastema between lower left lateral and cuspid.

Vol. I, page 72. Diastema between superior central incisors.

Vol. I, page 84. Diastema between superior left cuspid and bicuspid, and asymmetry of the arch.

Vol. I, page 85. Anteversion of all the succedaneous teeth.

Vol. I, page 73. Diastema between inferior right lateral incisor and cuspid.

Vol. I, page 81. Lower bicuspids have bifurcated roots.

Vol. I, page 87. Lower left cuspid has two roots.

Vol. I, page 88. Exostosis of roots of superior second left molar.

Vol. I, page 95. Asymmetry of arch. Absorption of process.

Vol. I, page 96. On the right side the lower bicuspids and molars articulate outside of the upper. Great absorption of the alveolar border.

PATRICK COLLECTION, MISSOURI HISTORICAL SOCIETY.

Vol. I, page 1. The molar teeth become smaller to the posterior on both sides of superior set. Teeth very regular and compact. Superior teeth quadricuspid. The inferior molar teeth gradually decrease in size to the posterior. Dent on left portion of frontal bone, bony cicatrix showing same.

Vol. I, page 4. Right superior lateral incisor shows cyst extending to the palate process. Left cuspid gone, showing extensive abscess perforating antrum and forward to the ala of the nose.

Vol. I, page 5. Roots of the molars are exostosed and the border of the process hypertrophied.

Vol. I, page 6. The anterior teeth more or less abraded. The second and third superior molars right and left are tricuspid and small and of equal size, all having but one root each, or the roots connate, having no root septa.

Vol. I, page 7. Superior right first molar roots divergent, exostosed and exposed at the buccal region. Teeth worn. The second superior left malar process absorbed, exposing the roots of the teeth.

Vol. I, page 8. The roots of the first and second bicuspids right and left are bifurcated.

Vol. I, page 9. Second and third superior right and left molars are small, tricuspids of equal size, triple roots clubbed together.

Vol. I, page 10. Exostosis of the first and second right molars with alveolar cysts involving the external wall and confined to the alveolar process and not involving the palate process. The inferior incisors worn badly on their posterior surfaces.

Vol. I, page 12. Enamel horizontally grooved in the upper and lower teeth, deep vertical grooves in the upper incisors and cuspids. Left inferior cuspid elongates from loss of superior occluding tooth; external wall gone, exposing root.

Vol. I, page 13. Exostosis of the superior first molars on buccal root.

Vol. I, page 15. Without teeth. Absorption of the process complete of the superior and inferior maxillæ. Must have lost teeth very early. On the superior maxilla the absorption extends to the nasal spine or process, etc. Right parietal and temporal gone from decomposition after burial.

Vol. I, page 16. The left superior central incisor present, but evidently the pulp was dead during life, the color indicating that fact, it being darker than the rest of the teeth submitted to like circumstances.

Vol. I, page 18. Anterior wall of the superior maxilla very thin, exposing the roots of the teeth in the region of the cuspids and molars. Diminution in size of molars to the posterior of the superior. The first inferior left molar fractured on post-lingual margin.

Vol. I, page 19. On the grinding-surfaces the enamel is worn off. The right superior lateral incisor dead ante-mortem.

Vol. I, page 20. Badly decomposed; the few remaining teeth are good. Occlusion not determined.

Vol. I, page 21. Fracture on the lingual posterior margin of the left inferior first molar. The third molar very small on superior maxilla.

Vol. I, page 22. Rotation of bicuspids one-fourth. Buccal cusps turned in, and the right bicuspid inside arch. Horizontality of both superior third molars, and both superior third molars small. Lower teeth regular and compact. The teeth are massive.

Vol. I, page 23. The first superior molars larger than the second, and the second larger than the third. The lower teeth also smaller to the posterior.

Vol. I, page 24. The superior molars become smaller to the posterior.

Vol. I, page 25. Teeth massive, very much worn.

Vol. I, page 26. Inferior left second bicuspid rotated one-half, lingual cusp to the posterior and buccal cusp to the anterior. The left third molar much larger than the right third, and rotated one-half, the buccal side to the posterior.

Vol. I, page 27. Superior molars gradually smaller to the posterior.

Vol. I, page 28. In upper jaw teeth are smaller to the posterior, in the lower jaw the teeth are slightly larger to the posterior.

Vol. I, page 29. Upper and lower teeth are worn down one-third.

Vol. I, page 30. The upper teeth from the first molars are very much smaller as they retreat to the posterior. The lower teeth from the first molars decrease in size to the posterior.

Vol. I, page 32. The teeth all good; no decay with the exception of the inferior right second molar, buccal side. Lower molars equal size; upper molars smaller to the posterior.

Vol. I, page 36. Great absorption of the process from the presence of salivary calculus, exposing the roots of remaining teeth.

Vol. I, page 38. The teeth on this lower jaw were lost early (ante-mortem). The roots of the right central and cuspid are fused together, the right lateral lost early, and owing to inflammation caused by the loss the fusion of the adjoining teeth followed.

Vol. I, page 42. The superior maxilla shows asymmetry of the arch at the expense of abrasion of the teeth on the right side. The right superior not worn, but elongated, showing loss of opposing teeth; the teeth on the left side not much worn. Lower jaw missing.

Vol. I, page 43. A lower jaw taken from a mound near the Cahokia Mound; this jaw reposed on a large earthenware, shallow plate; no other osseous remains were found with it. The bone shows that it had been scraped clean of soft tissue before interment.

Vol. I, page 44. Lower jaw gone. The right molar and bicuspids showing no abrasion, but elongation, owing to loss of the occluding teeth of the lower jaw.

Vol. I, page 50. Inferior second and third right and left molars, worn down on their posterior surfaces. Inferior right and left second and third molars inclining forward. The first molars upright.

Vol. I, page 52. The remaining teeth worn down below the cusps, that is, the base of the cusps. Superior left first molar ante-mortem fracture.

Vol. I, page 54. The teeth of the superior maxilla worn below the enamel. Teeth of lower jaw good, but worn down as in upper.

Vol. I, page 55. The third molars in the inferior maxilla in the process, the crowns directed to the anterior. Enamel good, cusps very little worn.

Vol. I, page 57. Upper jaw gone. Lower jaw shows abscesses; teeth badly worn.

Vol. I, page 59. The remaining teeth much worn, exposing dentine on grinding-surfaces.

Vol. I, page 60. Superior second right molar elongated for want of occlusion with its opponent of the lower jaw. Teeth all badly worn. Superior first left molar elongated from same cause. Teeth badly worn on their grinding-surfaces.

Vol. I, page 62. In this collection of teeth from Indian graves there are in box (number 62) 18 sound molars and 5 decayed molars; 26 bicuspids, cuspids, and incisors, sound teeth; 9 badly decayed incisors, bicuspids, and cuspids, one of this number exostosed. In the small box marked (62½) there are three superior molars with what is termed by Salter sunken cusps, that is nodules of enamel at the bifurcation of the roots.

The importance of this investigation cannot be overestimated, especially that portion relating to diseases and anomalies of the teeth and jaws, for there is not a question that may arise in morphology, histology, or physiology on which the facts revealed in this investigation will not shed some light. A number of crania examined are recorded as "Mound-Builders" for no other reason than that they were taken from mounds. There are no valid reasons for separating the so-called "Mound-Builders" from the ancestors of the present races of Indians, seeing that we have the statements of early European adventurers that the American Indians when first observed were active mound-builders.

Many of the crania are recorded as the crania of females, without sufficient data. I have been unable to discover any anatomical difference in the male and female crania whereby the sex may be determined, nor have I found any one, after diligent inquiry, who has been able to furnish a key to the solution of the question. Size is no indication of sex.*

The depth of palate bears no proportion to the size or breadth of the arch. Some of the narrowest arches have the deepest palates, and some of the shallowest palates have the broadest arches, which renders it impossible to arrive at any rule governing proportion,—a fact well known to anatomists,—for it has long been established that the size of the teeth in human beings varies, and has no proportionate relation to the size of the body; thus, small persons have frequently very large teeth, while persons of colossal size often have narrow and small teeth. Large persons usually have large jaws; but the teeth do not correspond to the size of the jaws as often as the jaws correspond to the size of the body, either in large or small persons. There are large jaws with small teeth, and small jaws with large teeth. The latter occur more frequently in small persons, while they are of rarer occurrence in large persons. It appears to be impossible to establish any rule for proportion of parts by the measurement of any portion of the human body.

* "The female head is larger in proportion to the size of the body than the male." See "A Treatise on the Human Skeleton," by George Murry Humphry, p. 103.

SECTION VII.

ANATOMY, PATHOLOGY, AND SURGERY.

REPORT BY TRUMAN W. BROPHY, CHAIRMAN OF THE SECTION.

THE Section on Anatomy, Pathology, and Surgery most respectfully submit the subjoined report. In reviewing the work of the past year, we find that this department of our Association has presented much original matter. Reference to the various subjects hereinafter named will show that the year has been more than ordinarily a very fruitful one.

"On the Nature and Treatment of Pyorrhea Alveolaris and Its Importance to the Physician." By J. Fitzgerald, L.D.S. *The Lancet*, February 24, 1894.

"Hare-Lip Sutures." By R. W. Murray, F.R.C.S. England. *The Lancet*, April 28, 1894.

"A Few Considerations in Surgery for the Dentist." By Dr. G. Newkirk, Chicago. *The Dental Review*, January, 1894.

"Diseases of the Peridental Membrane and the Uric-Acid Diathesis." By Dr. G. V. Black, Jacksonville. *The Dental Review*, July, 1894.

"Points of Common Interest both to the Dental and Naso-Laryngeal Surgeon." By Dr. J. H. Martindale, Minneapolis. *The Dental Review*, July, 1894.

"Abscess of the Antrum of Highmore, with Cases and their Treatment." By Dr. E. Harrison Griffin, New York. *Medical Record*, March 31, 1894.

"The Surgery of the Maxillary Sinuses." By Dr. J. H. Bryan, Washington, D. C. *New York Medical Journal*, June 23, 1894.

"Operative Treatment of Cleft Palate." By Dr. J. Ewing Mears, Philadelphia. *Annals of Surgery*, Vol. XIX, 1894, p. 248.

"Fracture of the Lower Jaw with Separation of the Genial Tubercle." By G. G. Davis, Philadelphia. *Annals of Surgery*, Vol. XIX, 1894, p. 253.

"Osteosarcoma of the Upper Jaw, Removal, Non-recurrence." By Dr. Charles McBurney, New York. *Annals of Surgery*, Vol. XIX, 1894, p. 688.

"Bilateral Dislocation of the Inferior Maxilla of 136 Days' Standing." By Dr. Charles A. Powers. *Annals of Surgery*, Vol. XIX, 1894, p. 239.

"Suppuration in the Maxillary Sinus." By Dr. Marcel Lermoyez, of Vienna. *American Journal Medical Sciences*, Vol. CVII, 1894, p. 589.

"Suppuration in the Maxillary Sinus." By H. Burger, Amsterdam. *American Journal Medical Sciences*, 1894, p. 595.

"Dermoid Cyst of the Mouth." By Dr. Block. *American Journal Medical Sciences*, 1894, p. 103.

"Three Cases of Septicemia of Dental Origin." By Dr. W. D. Miller, Berlin. *Dental Practitioner and Advertiser*, April, 1894.

"Caries of the Alveolus." *The Dental Practitioner*, July, 1894. Editorial.

"Pyorrhea Alveolaris." By Dr. C. N. Peirce. *International Dental Journal*, January, 1894.

"Pyorrhea Alveolaris." By Dr. F. T. Van Woert. *International Dental Journal*, January, 1894.

"Physiological and Pathological Changes in the Alveolar Tissues from Operations for Correction of Irregularities of Teeth." By Dr. J. N. Farrar. *International Dental Journal*, March, 1894.

"Amelification and Epithelial Development." By Dr. Henry Burchard. *Dental Cosmos*, January, 1894.

"Ulceration and Abscess of the Dental Pulp." By Dr. Henry Burchard. *Dental Cosmos*, March, 1894.

"The Curative Treatment of Facial Neuralgia." By Dr. V. Jarre, Paris. *Dental Cosmos*, March, 1894.

"Phagedenic Pericementitis and the Gouty Diathesis." By Dr. Henry Burchard, Philadelphia. *Dental Cosmos*, April, 1894.

"Dental Fissures of the Upper Lip and the Vault of the Mouth." By Dr. John S. Marshall, Chicago. *Dental Cosmos*, May, 1894.

"Differential Diagnosis between Benign and Malignant Growths of the Oral Cavity." By Dr. Sigel Roush. *Dental Cosmos*, May, 1894.

"An Introduction to the Study of the Bacterio-Pathology of the Dental Pulp." By Dr. W. D. Miller, Berlin. *Dental Cosmos*, July, 1894.

"Pyorrhea Alveolaris." By Dr. W. X. Sudduth, Minneapolis. *Dental Cosmos*, July, 1894.

"Hare-Lip without Cleft Palate." By Dr. Norman W. Kingsley. *Dental Cosmos*, July, 1894.

"Some Suggestions as to the Relation of the Teeth to Empyema of the Maxillary Sinus." By Dr. M. H. Fletcher, Cincinnati. *Dental Register*, March, 1894.

"Resection of Symphysis Menti for Cancer of the Mouth." By Mr. Stanley Boyd. *The Lancet*, November 4, 1893.

"Case of Odontoma of the Lower Jaw; Removal." By Dr. Alfred Swann. *The Lancet*, December 9, 1893.

"On the Ultimate Condition of Cleft-Palate Cases after Operation, together with a Note on the Condition of the Palate during the Act of Snoring." By Dr. C. J. Bond. *The Lancet*, September 9, 1893.

"Epileptiform Trigeminal Neuralgia Treated by Horsley's Operation for Neurectomy of the Inferior Division of the Fifth Nerve." By Dr. A. W. Mayo Robson. *British Medical Journal*, November 18, 1893.

"Clinical Lecture upon Hare-Lip and Cleft Palate." By Dr. Thomas Annandale, Edinburgh. *British Medical Journal*, December 2, 1893.

"Correction of Deformities of the Oral Region." By Dr. Albert Westlake. *Medical Record*, November 18, 1893.

"A Case of Acute Empyema of the Antrum of Highmore of Nasal Origin." By Dr. Julius Wolfenstein, Cleveland, O. *New York Medical Journal*, August 5, 1893.

"An Improved Method of Draining the Antrum of Highmore." By Dr. George W. Major. *New York Medical Journal*, August 19, 1893.

"Sarcoma of the Soft Palate." By Dr. W. G. Simpson. *New York Medical Journal*, October 28, 1893.

"Remarks on Congenital Defects of the Face, with Exhibition of a Rare Form of Cleft Palate." By Dr. Harrison Allen, Philadelphia. *New York Medical Journal*, December 23, 1893.

"A Case of Dentigerous Cyst." By Dr. E. R. Mullett, Clinton, Ia. *Dental Cosmos*, 1893, p. 532.

"Adenoid Growths and Other Diseases Incident to Primary Dentition." By Dr. Annie F. Reynolds, Boston. *Transactions World's Columbian Dental Congress*, August, 1893.

"Pulpitis Chronica Idiopathica." By Dr. P. Macarovici, Jassey, Roumania. *Dental Cosmos*, August 14, 1893.

"The Surgical Engine and Its Uses." By Dr. M. H. Cryer, Philadelphia. *Dental Cosmos*, August 14, 1893.

"The Teeth and Hair: their Homology and Pathological Intimacy." By Dr. S. H. Guilford, Philadelphia. *Dental Cosmos*, August 14, 1893.

"Oral Pathology." By Dr. R. Finley Hunt, Washington, D. C. *Dental Cosmos*, August 14, 1893.

"Brophy's Operation for Closure of Cleft Palate." *Transactions World's Columbian Dental Congress*, August, 1893.

"Pathological Conditions of the Air Cavities to the Cranium Resulting from Dental Lesions." By Dr. I. P. Wilson. *Transactions World's Columbian Dental Congress*, August, 1893.

"Diseases of the Palate with Reference to Dentistry: Their Pathology." By Dr. Vida A. Latham, Chicago. *Transactions World's Columbian Dental Congress*, August, 1893.

"A Contribution to the Study of the Development of the Enamel." By Dr. R. R. Andrews, Cambridge, Mass. *Transactions World's Columbian Dental Congress*, August, 1893.

"Gingivitis Nudata." By Dr. Joszef Arkövy. *Dental Cosmos*, October, 1893.

"Death from Hemorrhage." *The Lancet*, June 2, 1894.

"An Original Method of Restoring the Alveolar Arch in Anterior Cleft of the Hard Palate and of Correcting the Deformity of the Ala Nasi in Hare-lip." By Dr. John A. Wyeth, New York. *Journal American Medical Association*, August 12, 1893.

"A Case of Fracture of the Jaw." By Dr. J. D. Thomas, Pittsburg. *International Medical Magazine*, January, 1894.

"Cleft Palate, both Hard and Soft, and Hare-Lip." By Dr. W. S. Forbes, Philadelphia. *Medical News*, September 2, 1893.

"Some Suggestions as to the Relation of the Teeth to Empyema of the Maxillary Sinus." By Dr. M. H. Fletcher, Cincinnati. *Journal American Medical Association*, December 30, 1893.

"Diseases of the Maxillary Bones and their Periosteum." By Dr. Vida A. Latham, Chicago. *Journal American Medical Association*, December 30, 1893.

SECTION VII.—Continued.

A New Operation for the Exsection of the Inferior Dental Nerve.

PAPER BY TRUMAN W. BROPHY, CHAIRMAN OF THE SECTION.

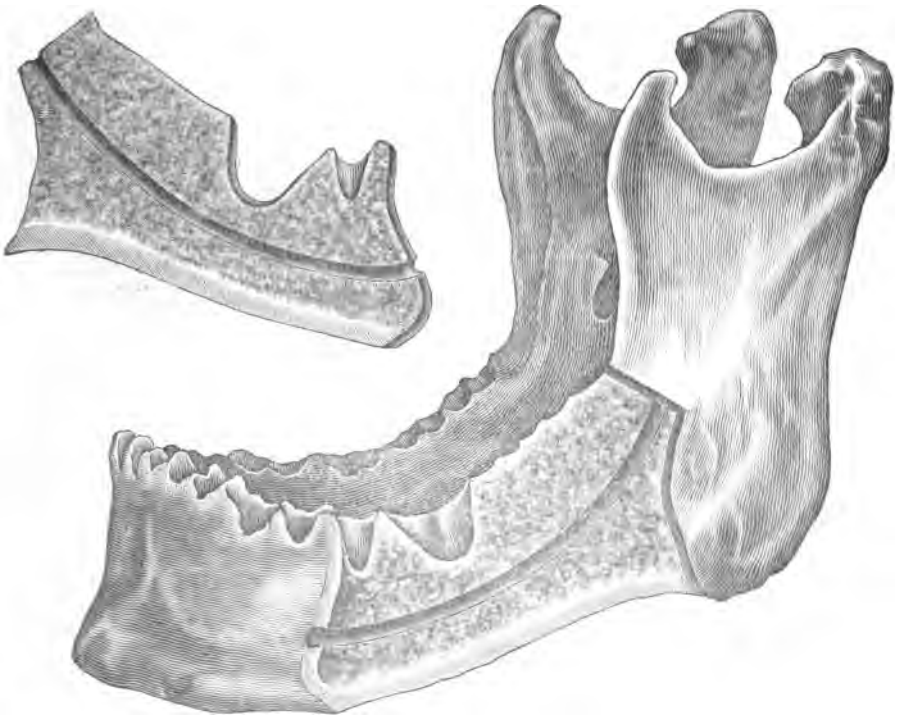
SIMPLICITY and efficiency combined in the performance of surgical operations is the aim of every progressive surgeon. Complicated operations should invariably be supplanted by simpler ones, provided the simpler operations yield equally good results. The operation for removing the inferior dental nerve has been performed in various ways, the removal of the nerve being accomplished by external incisions along the lower border of the jaw, the tissues being reflected outward and upward, the bone denuded over the inferior dental canal, a wedge-shaped piece of bone removed from the mental foramen backward to the anterior border of the masseter muscle, and the nerve lifted from its canal, drawn forward, and excised. The writer has frequently deprecated the making of external incisions. He still believes that external incisions for the exsection of the inferior dental nerve, and many other operations about the mouth and face, are uncalled for and unnecessary.

The ingenious operation described in a paper read by Dr. M. H. Cryer, of Philadelphia, at the World's Columbian Dental Congress, consisted in an incision over the ramus of the jaw, exposing it and removing a block leading from the sigmoid notch down to a point corresponding to the position occupied by the inferior dental foramen, exposing the nerve as it enters the canal, and lifting the nerve from its place, dividing it, and removing it by drawing it backward after first dividing it at the mental foramen. By this procedure the nerve is wholly removed from the inferior dental canal. No one

would doubt the efficiency of this operation, as it would unquestionably be thorough.

The operation of stretching the nerve has its disadvantages, and it is not generally to be relied upon in relieving neuralgia.

The operation which I have devised, practiced, and which I recommend to the profession, in consequence of its simplicity and efficiency, was conceived by me while engaged in operating, by the



passage of a flexible silver probe into the canal. It occurred to me that the application of a flexible drill, after the form of Gates's dental canal drill, entered at the mental foramen and carried backward to the inferior dental foramen, would thoroughly remove the contents of the canal.

The next patient who came under my care requiring such an operation was operated upon in this manner. It became necessary, before the introduction of the drill at the mental foramen, to bevel a little of the bone at the foramen, by means of the dental or surgical

engine, so as to enable me to introduce a drill on a line with the canal. On examination of the bone it will be found that the canal makes a curve about one-half inch posterior to the mental foramen, and then gently curves upward as it passes back to the inferior dental foramen. The flexibility of the drill, therefore, makes it very easy to traverse the canal, and do it quickly.

Drills used for this purpose should be graduated and so constructed as to cut as they pass along their course, after which, if the operator so desires, a broach of a large form, constructed after the form of the Donaldson broach for the removal of the dental pulp, may be carried back in the canal, worked around, and any remnants of nerve-tissue remaining can be thoroughly removed.

The instruments which I exhibit to you, and the drawing which appears before you, together with the inferior maxillary bone which I show you, will clearly convey to your minds the method of procedure in performing this operation.

After the nerve is removed (which it is unnecessary to say should be attended with antiseptic precautions), the after-treatment consists in antiseptic cleanliness.

DISCUSSION.

DR. TRUMAN: What is the result of such operations?

DR. BROPHY: The result is the relief of the neuralgia.

DR. TRUMAN: Did it afford relief in this case?

DR. BROPHY: Yes, it has done it in every case. I am not in the habit of introducing evidence from patients, but I was very happy to receive a letter the day before leaving home from a patient upon whom I had operated, to the effect that he was quite well. That was something like three weeks after the operation was performed. This operation is not at all difficult to perform, and the advantages are apparent. It avoids what I believe to be unnecessary division of the tissue, and there is no sacrifice of tissue at all, except that which we intended to remove.

DR. CRAWFORD: What was the age of the patient for whom this operation was performed?

DR. BROPHY: I have performed this operation by the method here advocated three times only.

DR. CRAWFORD: How old were those three?

DR. BROPHY: One was a man about fifty years of age, the second was a man about thirty years of age, and the third was a woman of, I should say, twenty-eight or thirty years of age.

DR. MARSHALL: Looking at his instruments, I should like to ask Dr. Brophy if he performs these operations without any division of the lower lip?

DR. BROPHY: Yes.

DR. MARSHALL: How did you manage to get into the mental foramen without dissecting the lip away from the jaw-bone?

DR. BROPHY: It is not necessary to dissect the lip away. The specimen of bone which I pass around for inspection shows that an incision has been made down over the foramen, and the tissues reflected backward a little. With the bur the foramen is enlarged from above downward in such a manner as will be apparent by examining the other specimen. Then the external covering of the canal is removed. This is to enable the operator to carry his drill on a line with the canal. Then the point of the drill is introduced and carried directly backward, the index finger of the left hand resting on the inner portion of the ramus in such a way as to recognize the presence of the drill before it passes through the soft parts into the oral cavity. That I regard as a matter of great importance, that the tissues at the inferior dental foramen be not opened into the mouth. It is of great advantage to have that tissue remain intact, and when the drill is carried back to that point, as can easily be done, we can remove the contents of the canal without difficulty. It is done far more easily than we can sometimes remove the dental pulp, or that portion of it occupying the root of a tooth.

DR. MARSHALL: Do you pass the drill so that it passes on the inner aspect of the ramus?

DR. BROPHY: I can feel it beneath the membrane.

DR. MARSHALL: What do you do about hemorrhage?

DR. BROPHY: There is no hemorrhage to amount to anything, except that which comes from the division of the tissues to open up the mental foramen, and that is just why this operation is especially commendable. If you were to pass a bistoury back and divide the vessels and nerve at the inferior dental foramen within the mouth, then you would have hemorrhage, which is avoided by this operation.

DR. MARSHALL: How long is it since the operation was performed?

DR. BROPHY : I think it was in April of this year.

DR. MARSHALL : Sufficient time has not elapsed to know whether there will be a recurrence of the difficulty or not in that case.

DR. BROPHY : Is that intended as a question?

DR. MARSHALL : No, it is intended as a statement. Time enough has not elapsed to prove that there will not be a recurrence in this case, for the history of all of these cases of exsection, or removal of the maxillary nerves for facial neuralgia, goes to show that there is a recurrence of the neuralgia. Relief may be secured for a time. I have known patients to go for a year without a recurrence, but usually it takes place inside of that time, and the operation must be performed two, three, and four times before success is attained, and sometimes success is not then reached. My experience in these operations has proved this position. There will be a re-formation of nerve-tissue, so that by and by the same condition will maintain as at first, unless the disease is one of peripheral origin. In a great many of these cases the difficulty does not lie in the canal at all, but farther back, where you cannot readily reach it surgically, lying in the ganglia or in the brain. It sometimes happens that spiculæ of bone have formed in the canals at their cerebral orifice, or there may be an enlargement of the nerve, producing pressure, and that beyond your reach. You cut off the peripheral end of the nerve, and there is relief; but by and by nerve-tissue is built up again, and the same conditions are established as at first, and it seems to me that so far as the practical results are concerned, there is no advantage in this operation over the others. But I do think that perhaps it is an easier way than the old method of performing this operation, though I do not consider the latter a difficult operation, and it can be performed in the mouth without an external scar. I do not like the operation which has been practiced so many times by Dr. Garretson, of laying open the tissues along the lower border of the jaw, deflecting the cheek up, baring the bone, and lifting out the nerve. It is a very pretty operation to the surgeon, and, if he does it quickly, makes a nice impression on his students. It is a brilliant operation if performed with the surgical engine and all that sort of thing, but it isn't a bit better than some simpler operations, which certainly do not disfigure the patient so badly. On that account, at first thought, I like the method of Dr. Brophy better than the method of Dr. Garretson, because it isn't likely to leave a scar; but I should expect to find considerable hemorrhage from the operation he describes, especially

if he should happen to puncture the walls of the canal. Then he might have to ligate the external carotid artery before he could stop the hemorrhage. In another case he might have to plug the canal to stop the hemorrhage.

DR. CUSHING: Did you not tell me that there would be no recurrence of growth in the canal?

DR. BROPHY: That would be an answer to what Dr. Marshall asked. I did make that statement, and I make it again, that there will never be a growth of nerve-tissue if the method is pursued of removing the internal wall of the canal. I have removed this nerve many times by the operation I have mentioned, by dividing the tissues and removing the external covering of the canal, removing the nerve, and reaming out the canal throughout its entire length; and by this procedure there will be a deposit of plastic material which will organize bone, and the canal will be filled solid, and in such a state the nerve can never re-form. I have cases that I operated upon as many as eight or ten years ago, and there has never been a recurrence of the trouble. This operation is simpler. By means of these instruments the dense tissue within the canal may be thoroughly removed, and there will be a deposit of bone which will fill the canal and will prevent a re-formation of the nerve, provided the trouble is at a point outside of the mental foramen or within the canal, where it generally is. I didn't deem it necessary or desirable, in presenting as briefly as I could this operation, to go into the etiology of neuralgia. It is true, as we all know, that it does exist within the brain. We do know that the Casserian ganglion has been removed. A distinguished surgeon has stated to me that he doubted whether it had ever been wholly removed; but we know that Dr. Garretson, of Philadelphia, and Dr. Andrews, of Chicago, assert that the Casserian ganglion has been removed. I have no reason to dispute their statements. But when the neuralgia exists along the track of this nerve, within the portion that we propose to remove, as in this case, where the nerve was three or four times its normal size without the mental foramen, and constricted at that point as though it had been ligated, I expect to effect a cure; and I have no doubt that by reaming out the canal the exudate will surely follow, the canal will be plugged with bony structure, and there will be no recurrence of the neuralgia.

THE PRESIDENT: I am very much interested in this operation. I should like to ask Dr. Brophy what he would do if the instrument broke off.

DR. BROPHY: I should be exceedingly cautious not to allow that to happen. I think if the instrument is manipulated with the care that is necessary, so as not to exert too much force, there is little danger of that; and I will say that it does not require very much force. If the instruments are properly made and tempered, and are used in the manner I have described in my paper, beginning with a small one, and then going on to one that will completely fill the canal, that is not likely to happen. If I were so unfortunate as to break off the instrument, then I should proceed to remove the external plate of the bone and remove the instrument with the nerve.

SECTION VII.—Continued.

Planting Teeth.

PAPER BY WM. N. MORRISON, OF THE SECTION.

IN the Centennial year, at Philadelphia, I reported a number of cases of replanting and transplanting before this Association, believing that I had worked out a new and important innovation or improvement by removing all root-vessels and filling canals perfectly with gold wire or other indestructible substance; but my attention was called to an article by Sir James Fox, who anticipated this operation more than one hundred years before.

For eighteen years I have kept steadily in the practice of planting and transplanting teeth, aggregating now many hundreds, and in not a single instance have I had what I would call an unfavorable or dangerous symptom.

Of the cases reported at that time, most, if not all, have gone over to the great majority, but a few have illustrious successors who are acting well their part.

At that time I relied upon fresh specimens, but a few hours (not to exceed twenty-four) from one mouth to the other, and usually obtained from mouths where the crowded condition rendered it desirable to have spaces caused by extraction; but since the experiments of Younger demonstrated the value of dry specimens, the operation is greatly facilitated, though fresh ones are preferable.

I felt exceedingly chagrined and was terribly disappointed during the Congress at the World's Fair that a subject of so much magnitude, from the physiological and pathological standpoint, to the profession, and the anatomical, masticatory, and esthetic to the public, should not have been brought up and discussed by the number of

learned physiologists and pathologists which our country boasts, whose names hold high position on the catalogues of our colleges, and who pretend to be so keenly alert to everything progressive. When the question is asked, why the odontoclasts will attack the roots of some planted teeth which have been comfortable in the alveolar process for twelve or fifteen years, they have not given us a rational or intelligent answer, nor vouchsafed us a preventive line of treatment.

It is an unhealthy, neglected, and tumefied condition which encourages this retrograde metamorphosis; hence physical culture is absolutely preventive of all classes of microscopic enemies that work destruction in the mouth.

I have not interrogated the domain of the chemical world and slugged the system with her drugs, but have empirically discovered or stumbled on to a massage treatment with the ball of the finger and bristles of the tooth-brush of the whole plate of the alveolar process, exerting friendly friction several times daily, with frequent rinsing with warm water, which I have found will preserve them, root and crown, for the longest time. The patient who thoroughly follows out this line of treatment rarely loses a planted tooth.

I would like to report the following cases so far successful. From my standpoint I call all cases successful that remain firm in the socket two, five, ten, or fifteen years: The case of Mrs. S. B., reported in the American Transactions, 1875: "A first lower molar in the mouth of a lady about forty years of age, of very delicate constitution and anemic habit. The condition of the gums about the roots of the teeth was bad. They had receded, and a thin brown scale of tartar was quite abundant beneath, notwithstanding the patient's good care of her teeth. This tooth had a large cavity of decay in the distal surface, exposing the pulp, and had been kept filled with oxychlorid of zinc for a year or more. When the case came under my care, there was decay also on the root below the oxychlorid filling. The pulp in the posterior root was dead, but that in the anterior root and part of the body of the pulp alive. The patient and her husband were anxious to save the tooth, but the necessary filling operation would have been too exhausting for her to bear. Consequently the tooth was extracted and filled out of the mouth, roots and crown The tartar was removed thoroughly from the roots, and the tooth returned to its place. For three or four days the patient suffered considerable pain, but in a few weeks the tooth was comforta-

ble and firm; and now, about five months since the operation was performed, she has a whole tooth except the part destroyed by decay. In fact, it is the firmest tooth in the arch, which is full, and the gum has a more perfect union than it has had for years."

It is gratifying to me to state that this tooth was still a useful member of the mouth a year or two ago, when the patient was last seen, showing this case of a replanted tooth has done faithful service for nineteen years.

Mr. F. B. E., specimen No. 1. A tooth transplanted by a neighbor dentist, who used a dry specimen and reamed out the root-canal too much before packing with the gutta-percha, which expanded after a few months, cracking off the labial face, leaving the palatal portion and a firm root, upon which I adjusted a metallic crown. In a short time this was broken down, owing to too strong an occlusion. It then became necessary to plant a new tooth. The root was drilled out and the tooth implanted September 26, 1890, which is a magnificent success.

Miss G. C., specimen No. 2. Was replanted in 1879, and exhibited before the St. Louis Dental Society on many occasions. The case was perfectly well known to all its members, some of whom pronounced it a failure; however, it remained in the jaw for fourteen years, and its successor was transplanted October 7, 1893.

Colonel K., specimen No. 3. A gentleman about sixty years of age came to my office a few months ago with a crown and a portion of the root in his hand, which he himself had extracted. The space between the adjoining teeth was very annoying to him in his profession. The rest of the arch was nearly complete, and it would have been a great annoyance to wear a plate for one tooth. Another tooth was transplanted to this socket, and is now firm and useful. The part of the root which I extracted with forceps gives evidence of nature making an effort to repair the fractured root by secondary dentine, which will be seen in specimen No. 3.

SECTION VII.—Continued.

A Question in Pathology.

CASE PRESENTED BY J. HOWARD GASKILL, OF THE SECTION.

DR. GUILFORD: I should like to call up the subject of pathology, for the purpose of bringing to the notice of the Association a very remarkable case of hypertrophy of the pulp that was overlooked when the subject was under consideration a day or two ago. The case was presented before the Odontological Society of Philadelphia at one of its recent meetings, and as the gentleman into whose hands it came is present, I would call upon Dr. Gaskill, of Philadelphia, to give us an account of it.

DR. GASKILL: This case is rather unique. The patient presented himself to me first about two and a half years ago. On examination, there was a pink spot which showed on the central incisor, and which could be seen distinctly both through the labial and palatal walls. There was no external opening. The tooth was perfectly sound externally. I awaited developments, thinking possibly it might heal spontaneously, as it had apparently come, with no irritation or pain of any kind. I waited six weeks, and the patient again presented himself. The palatal wall was crushed in by mastication. I removed the pulp, and found that the absorption had gone on so far that the enamel wall was thin enough to allow me to see my instrument through it from the labial side. I filled it with oxyphosphate, and the patient had no further trouble. This spring he again presented himself with a recurrence in the other central incisor. I then took the patient to several gentlemen in Philadelphia, among them Dr. Kirk. He suggested, without any real hope of success, a systemic treatment. The patient was given iodide of arsenic and Fellows's hypophosphites, and very remarkable to say, the pulp is assuming its normal condition, is depositing possibly a secondary dentine, and

the spot is now hardly discernible. At the time I showed it to Dr. Guilford he said, "The enamel must be very thin there to enable me to see the pink gutta-percha through it." It was simply the pulp which he saw, and which was perceptible through the labial and palatal walls. Now it is filling up. I am sorry not to have been able to have seen the patient just before I came here. I showed the case to Dr. Kirk three weeks ago, and he also acknowledged that there was a filling up, a marked decrease in the pink spot; in fact, it was very slightly perceptible.

DR. CRAWFORD: How old is the patient?

DR. GASKILL: He is a colored boy of about twenty, perfectly healthy. I had his blood examined microscopically, and it was found to be in normal condition.

DR. WEST: What was the first treatment besides Fellows's hypophosphites?

DR. GASKILL: Iodide of arsenic. I should like some one to throw some light on this case, to give a reason for it. Since then Dr. Jack's son has had a similar case.

DR. JACK: In my experience I have observed two such cases. One occurred when I was a student over forty years ago, in the practice of my preceptor, and within the past three months a case has come under the care of my son. In the latter case a very large amount of the dentine had been resorbed. The point of closest approach to the outer wall of the tooth was at the inner mesial aspect. The destruction of the tissue reached to the superficies of the cementum a little above the margin of the gum. The cavity formed by the resorption was very large. Dr. Foster Jack did not consult me in the case, but pursued what seemed to him to be the rational course. He drilled into the pulp-tissue at the nearest point, destroyed the pulp, and filled the upper portion of the pulp-chamber and root-canal with gutta-percha, and the cavity with phosphate of zinc.

DR. GUILFORD: Was it a sound, undecayed tooth?

DR. JACK: In other respects the tooth was perfectly sound. There had been no previous treatment of the tooth in any respect. I also observed both the cases of Dr. Gaskill, the first one after he had destroyed the pulp and filled the tooth, the second one in the stage at which he first exhibited it to Dr. Kirk, where the pink spot was quite apparent on both the labial and palatal surfaces of the tooth, presenting an appearance extremely similar to the one which I observed when a student as much as forty years since.

DR. ABBOTT: This, I believe, makes five cases of the absorption of the inner portion of the dentine from the pulp out, reported from the city of Philadelphia. I have never heard such a case reported from any other place, and have never seen anything resembling it. There can be but two solutions of the question. There must have been some opening into this tooth by which acid could have gotten through, or there must have been some irritation of the pulp to cause the absorption of the tooth itself. How it is possible for an irritation to exist in the pulp of a tooth sufficient to affect the dentine about it, or for the lime-salts to be taken up and carried away without a disturbance which would result in the death of the pulp, is a mystery to me. I don't at all question the statements which have been made. I simply don't understand how such things can occur. The dentine, of course, must be destroyed in a similar manner to the destruction of the roots of temporary teeth. What could cause this irritation in the pulp of a tooth is the question, if it occurs in the manner as stated. Why the bones all over the body are not destroyed and the patient left limp, like a piece of rubber, I cannot imagine. I don't see how such a thing is possible. As stated, we have a substance which is harder than any bone-tissue in the whole human frame destroyed in large quantities, sufficiently to allow the pulp to be seen through the shell, without any external opening at all, without the presence of an acid to dissolve the lime-salts away, and apparently without any irritation that would result in death of the pulp.

DR. MARSHALL: When Dr. Abbott got upon his feet I expected that he would be able to explain that very easily, by the hypothesis which he has strenuously advocated, of the retrograde metamorphosis of tissue. Now, it does not seem to me it is any more difficult to understand the explanation of this case than it is to understand the explanation why the roots of living teeth are sometimes resorbed. I am not speaking now of the deciduous teeth, but of permanent teeth, which osteoclasts have removed. May there not be osteoclasts formed in the pulps of these teeth? It is no more difficult to understand than the other, provided the hypothesis is correct. I wish Dr. Abbott would say something on this point.

DR. ABBOTT: As I understand the resorption that takes place in bone, there are no such particular organs, corpuscles, or cells as osteoclasts, which break down the tissue. It is effected by a process of irritation. The lime-salts from this constant irritation are dissolved or broken down and taken away,—the same process, only retro-

grading, by which the tissue was built up. There is no other way in which bone can be absorbed. The mass of medullary tissue which has been termed the osteoclasts is often contained in the end of a temporary tooth when it is taken out of the mouth. This is the same substance (papilla) which became, through regular steps in the formation of the dentine, the root of the tooth. It reappears as the lime-salts are disorganized and carried away by the circulation.

DR. MARSHALL: Is not that just the explanation of the condition of this pulp?

DR. ABBOTT: Of course it is. Now, what is the irritant? There are no such things as osteoclasts or foreign bodies present. I want that distinctly understood. There must be the existence of an irritant of some kind, and it must be in the pulp of the tooth.

I have never heard of such a case as these under discussion reported from any other place except Philadelphia. It may be possible that there is something peculiar about that locality which produces certain kinds of disturbances not elsewhere known, as there are many places where diseases occur which never occur anywhere else. I cannot conceive of anything that could produce this irritation, unless we go back to some specific poison at work upon this organ confined within the tooth, and which can find no relief except by breaking down the surrounding tissue.

DR. MARSHALL: Until I get a better explanation I shall stick to the osteoclasts. It strikes me that that is the explanation of the difficulty. Osteoclasts are the result of irritation, though we don't know what the particular irritation may have been in this case; possibly shock. It may have been shocked from something very hot taken into the mouth, or exposure to cold in winter. The formation of the osteoclasts, it seems to me, is easily understood, and would explain the phenomena in this case.

DR. ABBOTT: Will Dr. Marshall be kind enough to explain what an osteoclast is, where it comes from, and what it amounts to?

DR. MARSHALL: I don't know where it comes from. They are found though, and do their work of removing tissue.

DR. ABBOTT: Did you ever find one?

DR. MARSHALL: We find what we call osteoclasts, and my position is just as tenable as yours. You cannot prove your position, nor can I prove mine.

DR. GASKILL: What becomes of the osteoclasts in my treatment, which has proven effectual?

DR. ABBOTT: That is just what I should like to know.

DR. GASKILL: Dr. Jack suggested that osteoclasts were the cause. Now that we have obtained a cure, it hardly seems that that can be the cause.

DR. MARSHALL: I do not see any difficulty in that. Osteoclasts do not continue their work always until they destroy what they attack. Remove the cause of irritation, and the osteoclasts disappear. Occasionally, where they have scooped out a large portion of the side of a root, and when the irritation has subsided, the osteoclasts disappear, while the cementoblasts commence their work and build up the tissue again. I have specimens in my office of that character. You gentlemen have all seen cases of that kind.

DR. HOLLY SMITH: Dr. Abbott's remarks in reference to his failure to understand this phenomenon remind me a little of an illustration which was used by the late lamented Henry W. Grady in an address before an association in Boston. He said that some boys, who had a feeling of animosity toward an old preacher, got his Bible and pasted together the leaves, so that when he came to read his lesson in the morning he began, "And Noah took unto himself a wife, and she was"—and then he turned over the page—"fifty cubits broad and three hundred cubits long, and tarred inside and out with pitch." The old man read it over and said, "Well, my brethren, I have never read this passage of Scripture before, but I believe everything that is within this book, and it is only another evidence that man is fearfully and wonderfully made." So that it is possible that we cannot understand all the various phenomena. I would suggest as a solution of these cases that, as they seem to occur only in Philadelphia, possibly this may be the degeneration of brotherly love.

DR. PALMER: I seldom present anything which cannot be demonstrated, but there must be liberty to make suggestions. We are first to consider how these organs are built up. What is nature's process of constructing living bodies? You will see that all organized substances, all animal bodies, are built up on that which we should call the negative side; that is the opposite to acids. Now, when there is any perversion, or the circulation is cut off, all that is necessary to present this very phase you are considering is for nature to reverse the process and undo what has been done. We have some proofs that there are local points at which this is done. It does not require any outside exposure to do it; but when the current that went to build up and fortify is turned back, it takes the lime-salts back into the

system, and that will account for it. There are gentlemen here who have witnessed that where large gold fillings have been inserted, and have remained for years, there will come a sensation and irritation, so that the filling will have to be removed, the lime-salts having been absorbed until the pulp has become exposed to thermal changes. Now, when this irritation is great enough to produce that, destruction of the pulp may follow. Sometimes a tooth may wear a clasp which will cause an irritation on one side, and that may produce a deposition of lime-salts, or fill up the pulp-cavity. I am speaking now of a slight irritation, which will cause a deposit; but in the case of an ordinary cavity, there we have something which nature does not attempt to remedy because it is an acid. It is the opposite of what nature used to build it up, and the pulp remains the same without attempting to fortify. When we put in some non-conducting material or stop the irritation, nature will go on then, as it does under gutta-percha frequently, to fortify and build up, so that we may produce the proper filling in time. There is nothing mysterious about it if we can only follow the continuity of a body from the chemical up into the organic, and see the workings of nature in producing the current which goes to build up, and which may reverse and take down.

In the case of these teeth presenting spots upon the surface, in the one it led to destruction, in the other it was counteracted. Why? Because there was some systemic treatment. Perhaps the remedies administered restored nature to its condition to produce that effect. When that can be done, we have good results. It is the same way with the absorption of the roots of the deciduous teeth. Nature knows—I cannot tell how—when it is time to absorb the lime-salts back and give place for the incoming teeth. If the tooth is on the opposite side, it will absorb that side on which the pressure is. Whether that pressure produces the change of polarity I cannot say; but the whole of the business comes in the reversal of nature's process. Nature builds up on the alkaline side, and when there is a reversal of it then it is the acid.

DR. JACK: It seems a remarkable fact that the five cases—I only know of four—should have occurred in Philadelphia. There is no question of the authenticity of at least four of the cases, because I am satisfied that the observations were distinct and certain. Dr. Gaskill's two cases were exhibited to me. The one of my early experience was a case of certain observation which presented very much the appearance of the second of Dr. Gaskill's cases, but the accom-

panying features of the case I am not aquainted with ; that is, I don't know whether it was attended by any degree of irritation or not. It certainly presented the same distinct pink appearance on the labial surface of the tooth. The color was a decidedly higher grade than the normal ; it was quite pink in color.

In the case which came under the care of my son, the amount of the destruction of tissue was very large. I intended to state, however, in regard to Dr. Gaskill's cases, that there was perfect symmetry. It occurred at the same portion of each tooth. It appeared on the labial surface and on the lingual surface of each of the teeth, in perfect symmetry. In my son's case, however, it was situated more toward the mesial aspect, extending quite considerably beneath the gum, as well as involving the lower portion of the crown. In that case I am not acquainted with the previous history of it ; that is, I don't know whether it was preceded by irritation or not. I do not know either, from his description of the case, whether it presented the same degree of redness of color as in Dr. Gaskill's case, in which the color was extremely marked.

DR. HOLLY SMITH : What was the character of the surface of the cavity which was filled by your son ?

DR. JACK : The cavity was a regular cavity. By that, I mean it had no bay-like excavations, but was a clear and clean excavation, as if one had made it with a round burring instrument.

DR. CRAWFORD : Mr. President, I want to come to the help of Philadelphia. All of the cases of such phenomena are not confined to that city. I am very much interested in this discussion. The only criticism I would make in regard to the matter is that I doubt the propriety of saying that the pulp hypertrophied. I am rather inclined to think that the phenomenon can be accounted for by saying that it is a case of pulp-transformation ; in other words, that a tooth-pulp, instead of continuing to be a tooth-builder, becomes from some cause a tooth-resorber or remover. I am satisfied that if a careful clinical history could be obtained of every case of this character, it would be found that the tooth had been subjected to some injury of a local character, or that the individual had some constitutional conditions, which had impressed the organisms at this point, resulting in the transformation of the tooth-pulp into a tooth-destroyer instead of a tooth-builder. Living in the city of Memphis, Tennessee, is a gentleman who lost the roots of a superior sixth-year molar by this process. I have seen such phenomena in more than one case. The case

referred to is more distinctly impressed on my mind just at this time. In the examination of that case the patient reported a slight uneasiness and discomfort. Upon careful inspection I found all his teeth in good condition, and when I first looked at it I could see nothing wrong with that tooth. In exploring around the gum-edge and roots of the tooth, my instrument slipped into an opening on the buccal aspect. It gave the patient a little pain. I supposed perhaps that a little gingival decay had resulted in the exposure of the pulp. On making a further examination I soon found that the whole gum end of the tooth was void of bony tissue. I exhibited the tooth to a dentist, and he said it was a deciduous tooth. I called his attention to the fact that it had all the characteristics of a permanent tooth, that it had made its appearance in the mouth at the right time, and had every appearance of being a permanent tooth. That absorption was made seventeen years ago. I undertake to say that the condition referred to does not occur where the whole tissue of the tooth involved has become thoroughly or markedly necrotic.

DR. GASKILL: Dr. Jack has asked me to state that upon inquiry I was unable to find that there had been any irritation whatever. The tooth had not the slightest soreness. It was not unusually responsive to heat or cold, indicating a normal condition of the pulp. In the case in which I removed the pulp, the canal did not show a very marked increase in size. The apical foramen was slightly enlarged, but not as much as I had expected to find it under the circumstances. The pulp was very vascular. I applied the rubber-dam, and, using cocain, removed the pulp at once. I had some difficulty in stopping the hemorrhage at once. I put in a styptic; he came the next day, and then I finished the operation.

DR. MARSHALL: Did you preserve the pulp?

DR. GASKILL: No, I did not.

DR. OTTOFY: This idea of the presence of, or necessity for, osteoclasts, or rather odontoclasts in this case, has never satisfied me as reasonable. Those who have investigated the subject claim there is such a thing, but no one seems to be positive he has seen them, or satisfied himself that they really exist. The peculiar conditions which lead to the absorption of roots of teeth and of bone have caused men to invent a theory, and consequently we have the theory of osteoclasts. I see no necessity for them. The blood-stream is a sewer as well as a channel of nutrition, and why cannot the particles which are destroyed be removed through the blood-stream as well

as by specially formed osteoclasts? The blood-stream is full of particles of the carbonates, phosphates, etc. We know very well that the red corpuscles as well as the white almost always have attached to them particles of matter. Consequently there is no reason why, in the cases cited, the dentine could not have been removed in the same manner in which it was deposited. The statement was made that the dentine is a very hard substance. The dentine is no harder, when it is taken particle by particle, and in solution, than any other substance. When divided finely, as it must be before deposition, they float in the stream, and it is perfectly feasible for these same particles, when useless or destroyed, to be carried through the blood-channel without the necessity of a special destroyer or carrier. It is not unreasonable to suppose that some irritation caused an enlargement of the pulp, the enlargement resulted in pressure, and the pressure led to solution, the particles being carried away in the blood-stream without the intervention of osteoclasts or odontoclasts.

DR. MOORE: This case is not new. It was touched upon in this body more than ten years ago, by the late Dr. Atkinson, of New York. I had a case similar to that in a gentleman forty-five or fifty years of age. He is one of the rare specimens of humanity in whose mouth we could find no decay. His teeth were without a single filling. I had known him for a number of years, and had examined his mouth a number of times. He came to me saying that there was something wrong with his teeth. He felt a desire to grind and crush. It annoyed and worried him. I applied what relief I could, thinking it was some little passing irritation, but it continued. I examined his teeth most thoroughly with the electric light, and in every way, and I could find no disintegration at all. There was certainly no external cavity which could be found with the finest probe. I even separated his teeth. The difficulty was between the lower right first and second bicuspids. I could not tell which one it was. After a while he came to me with one of these teeth crushed in, and another tooth was softened. It cut like a piece of old mush. I wrote to Dr. Atkinson about this, and he told me that it was a liquefaction of the dentine, or a decalcification, taken up by the pulp, and that the only remedy was to destroy the pulp, and so cut off that process. I have had to do this with five of those teeth. Those are the only teeth in his mouth that are filled to-day.

Nature is the busiest thing in the world. She goes to work and builds up a structure in the most energetic manner, and the moment

that structure is completed she begins to tear it down just as rapidly. Now, I do not know whether there was any local cause for this, or whether there was any systemic cause. The gentleman did tell me that he could not pare his finger-nails without tearing them into the flesh. That was something that had come about recently. He had to use a file. Now there may be something systemic connecting the two together. This case had passed out of my memory almost until I heard this discussion here; but if you will refer to the Transactions of this body ten or twelve years back you will find that Dr. Atkinson touched upon this very subject.

DR. ABBOTT: Dr. Gaskill made one remark which seemed to open up the book a little in reference to the cause of this disturbance. He said that when he opened the canal, destroyed the pulp, and took it out, he found that the foramen was considerably enlarged, and that it took him a long time to stop the bleeding. Whether this enlargement occurred before or during the destruction of the inside of the tooth, of course he cannot tell. But it is natural to presume that that opening at the end of the root was increased in size to start with, that a larger flow of blood was sent into the tooth than normal, that it was over-nourished, and consequently over-irritated, so that through its over-nourishment it became an irritant, and dissolved, liquefied, or decalcified the dentine itself.

DR. JACK: There is one fact which throws some light upon these cases. In both the cases of Dr. Gaskill, and in the case of my son, the structure was of a low grade of organization, as is usual in colored people, and as happened to be the case in this man.

While I am on the floor I will state an occurrence which throws some light on this kind of resorption, and which must have been observed by others, which certainly in one case happened very markedly to me in the line of pulp-treatment. In one instance I removed a defective filling in a tooth that had been filled with amalgam by some other person. I found beneath the filling some *débris*, indicating that carious matter had not been entirely removed. After I had taken it away, I found a very large surface of secondary tissue; that is, the pulp had been protected by a deposit of secondary bone. I then filled the cavity with some kind of temporary material. After some years I found some irritation of the tooth, indicating that the pulp had become devitalized; on removing the filling it was seen that the whole of the secondary dentine had become resorbed.

DR. PEIRCE: Some gentlemen may recall the fact that five or six

years ago I reported a case at the New York State meeting held in Albany. A lady, who had been under my charge from childhood, having been for some years an anemic patient, complained of neuralgia radiating from the superior centrals. These teeth had been filled with gold for several years. The cavities were superficial, and until this time they had given no subsequent trouble. She came to me repeatedly, saying she could not endure the pain which was radiating from them. Finally, after several efforts to alleviate the suffering, I took out these superficial fillings, for they were very superficial, and I found the pulps in both incisors exposed. They had been filled for at least six years, but on removal the pulp-chambers were more than double their normal size. This patient was a lady thirty-five years of age. When the pulps of these teeth were devitalized and removed and the teeth filled, the pain passed away, though she still remains in a somewhat anemic condition. No other teeth have been affected. Why those two teeth should have been the seat of this condition I cannot tell. I only know that there was a decalcification of the dentine in these teeth until the thickness of the dentine was reduced to a minimum.

PRESIDENT PATTERSON: I have observed cases similar to the ones which have been spoken about, but upon examination of the teeth I have satisfied myself that the irritation came from imperfect enamel-structure in the first place, and imperfect dentinal structure; that the irritation was from the outside of the tooth, and not from the circulation at all. Although you cannot, as you say, with the most delicate probe find any imperfection in the enamel or in the dentinal structure, yet, if the tooth is extracted and you make sections of it, you will find abnormal channels in the dentine to the pulp which has been irritated, and then in the enamel you will find that imperfect structure which has allowed this irritation, which has then gone on, after once being set up, in the same way that caries goes on. I have found in such cases that that irritation unquestionably came from the imperfect tooth-structure, which permitted irritation from thermal changes and permeation of irritant fluids. There might be no outlet which could be discovered with the finest instrument, but if the tooth was placed under a glass after extraction, these imperfections in the enamel would be found. And when there are imperfections in the enamel there are generally canals of imperfection in the dentine, and the irritation comes directly from outside sources to the pulp. That has been my experience in every such case in my practice.

DR. MCKELLOPS: I should like to ask some of the gentlemen present how they diagnose calcified pulps? We find a great deal of suffering on that account. I remember a case where a gentleman came into Dr. Shepard's office where I happened to be, and said how much his wife was suffering. Her mouth was examined, and the teeth were found to be beautiful. No one could tell what was the matter. At last he decided to take out a tooth which appeared to be the cause of the trouble, and on taking it out he found the pulp to be calcified.

The youngest person in whom I have seen this was a child of ten years, where it occurred in a first molar tooth. This was a good many years ago. I should like some gentleman to tell me how it can be determined when this condition exists. This is a disease that has given a great deal of suffering, and I have never heard any reasons given for the why and wherefore.

DR. CROUSE: I should like to have some one tell me how to diagnose such troubles without drilling into the tooth. I have had two or three of these cases in my practice, which pretty nearly set me crazy and the patient too. I have one patient for whom I extracted four teeth, one after another, he calling me up in the night for two of them, the pain being so intense he could not stand it any longer, and I could hardly keep him in my chair long enough to pull the tooth. In each of these the pulp-cavity was filled up nearly full. There is only one rule I lay down in such cases, and that is, I hunt for everything else, and, if I cannot find anything else, then I conclude it is ossification of the pulp. When the pain is of a reflex character, distributing itself over the mouth and head, it is very difficult to locate the trouble. When I find one tooth which is more sensitive than the others, I tell the patient to watch the next time the pain comes to see if he cannot locate the place where it started, quickly, before the paroxysm of pain has ended. I have a case now where the patient has three teeth in which the pulps are calcified, and I think there is another, but I don't know which one it is.

DR. BROPHY: In making examinations and diagnoses of these conditions, I think gentlemen who have not made use of the electric incandescent light will find that by its use they will be able nearly always to make a distinction between a tooth which has a calcified pulp and one which has not. I have found it a very great help in these cases. If the room be darkened, and then the light employed, a certain degree of opacity will be observed in the tooth which is thus affected, marking it from those in a normal condition. While there

are other means which may be employed, I suggest this as the most satisfactory and efficient one with which I am acquainted.

DR. MARSHALL: I believe the diagnosis of these cases to be one of the most difficult things that we have to do in the whole line of dental practice. I know of but one way to do it. That is the way which physicians sometimes use in trying to get at obscure diseases, by the process of exclusion. If it isn't anything else it must be that. That is about the only way you can arrive at it, unless you drill into the tooth. You don't want to do that sometimes, when you are not entirely sure which tooth it is which is giving the trouble. The pain is usually reflected all over the side of the face, and the patient is unable to tell where the pain starts. Sometimes in quizzing a patient closely, you may find that a certain tooth at times feels *big*, as though the pulp was congested. I have had several of those cases, but the only way in which I have gotten at them is by this process of exclusion. I have taken the symptoms of all the diseases that I could think of which would be liable to produce pain of this character, and which might occur, and if I could not find those symptoms marked, I have said, "It must be calcification." But you must make a distinction here. I do not believe that peripheral calcification ever causes pain. It is the interstitial calcification, the formation of pulp-stones, which causes the trouble. I believe the pain is caused by the pressure upon the nerve-filaments of the pulp, the lateral pressure causing the pain. This pain is paroxysmal, not continuous. I have found out that when the patient has been running or walking rapidly, or bends over, there comes a paroxysm of pain. Try that the next time you have to make a diagnosis. Ask the patient to put the head down in this way, so as to let the blood run to the head, and see if it starts a paroxysm, and let him run across the office just enough to increase the action of the heart, so as to get a little extra pressure in the arterial system. That will give extra pressure upon the pulp, and produce pain if it is at all inflamed.

DR. MCKELLOPS: So far as the electric light is concerned, I have tried that over and over again, and I have never been able to learn anything in that way.

DR. ABBOTT: These cases present to us something mysterious, more so than almost anything else we have had to deal with. I should like to ask those of you who have not yet concluded what causes calcification of the pulp to think the matter over, and be able to give us something further as to the origin of this trouble. Let us be ready to talk this matter over next year.

SECTION III.

OPERATIVE DENTISTRY.

REPORT BY S. C. G. WATKINS, CHAIRMAN PRO TEM.

MR. PRESIDENT AND GENTLEMEN: No papers have been presented to Section III, neither has any interest been shown in the subject of Operative Dentistry. Both the Chairman and Secretary of the Section being absent, there is no record of any work having been done during the year. However, a few new appliances have been presented to the Section, which we will offer for the consideration of the Association.

Dr. Charles Sill, of New York, presented a new appliance which he calls a traction engine, and which he uses in making sub-cervical bands for crowning, or for measuring the crowns or necks of the teeth in making crowns.

Dr. J. N. Crouse, of Chicago, presented a new engine-bur, which will cut when pressure is put straight ahead as well as when lateral pressure is applied; the blades running across the end at right angles with each other, and so shaped that they will not clog when used in dry tooth-structure.

Dr. Crouse also presented a new engine and hand-piece, which the Section thought worthy of consideration.

There has also been presented to the Section an antiseptic preparation of "wood wool" in the form of small pads, to be used in the mouth as an absorbent in place of napkins, which is certainly very

convenient. It is said that it will absorb fifteen times its weight of water.

The S. S. White Dental Mfg. Co. presented a new electrical motor and outfit, called the Edison Battery Motor Dental Outfit, which the Section thought worth calling attention to.

Dr. Crouse also presented to the Section a new phosphate of zinc cement, which they examined, and found it a very smooth, fine-working, slow-setting, dense cement.

DISCUSSION.

DR. PEIRCE: I want to suggest one word in regard to the cement, which is pyro-phosphate. It is claimed that by virtue of the great amount of heat to which it has been subjected in its manufacture, it is less soluble in the mouth than the cements are generally found to be. I have experimented with it during the last four or five months, and while I want to be cautious in saying that it is insoluble, I do think it is less soluble than the cements are generally found to be.

SECTION V.

MATERIA MEDICA AND THERAPEUTICS.

REPORT BY GEORGE EDWIN HUNT, SECRETARY OF THE SECTION.

SEVERAL new remedies have received favorable consideration, and some of the older ones have further fulfilled their promises of usefulness since our last report.

SCHREIER'S PREPARATION. In the latter part of 1892, Dr. Emil Schreier, of Vienna, published a new method of sterilizing septic root-canals by the use of metallic potassium and sodium.

About two drachms of the mixture is put up in a small, securely corked test tube. The preparation is of a semi-fluid consistence and metallic luster, looking like mercury.

In using this method of sterilization the rubber-dam must always be in position. With a heated root-canal plugger the layer of paraffin, which covers the preparation as a protective, is perforated. Pass a nerve-broach through this perforation into the preparation, and on withdrawal enough of the remedy will be found adherent to begin the treatment.

Placing the point of the charged broach into the root-canal, it is gently rotated and gradually worked a short distance toward the apex. Almost immediately a hissing, crackling sound is heard, and a frothy-looking mass wells up into the pulp-chamber. This has the smell, and to a certain extent the composition, of soft soap. When reaction ceases this smeary-looking mass is wiped away, and the broach, charged with a fresh dose, is again inserted into the canal. The treatment should be thus continued until no further reaction occurs on the introduction of fresh material. The canals may then be washed out with three per cent. pyrozone, dried, dressed with

one of the essential oils, and at a subsequent sitting the roots may be filled.

In no case should the adjustment of the rubber-dam be dispensed with, for the strongly alkaline action of the kalium-natrium is highly destructive to mucous membrane.

The chemical action involved is explained by Dr. Schreier as follows: "The two alkaline metals inserted into the root-canal come in contact with a watery liquid. Immediately the well-known reaction takes place; the water is decomposed, with the development of considerable heat, by the production of potassium and sodium hydroxid and hydrogen. This latter burns up partially. In any case the nascent hydrogen can have but good effects for the present purpose. The sodium and potassium hydroxids unite with the fatty substances to form soap, which accounts for the characteristic odor."

In the few cases in which the writer has used Dr. Schreier's preparation it has accomplished its purpose thoroughly and well. Some apprehension has been expressed concerning the possibility of such violent action forcing septic matter, or, perhaps, some of the caustic alkalies, through the apical foramen, but so far no untoward results have been recorded. The taper of the canal, and the fact that the remedy is introduced at the larger end, tend to cause the products of chemical action to well up into the crown of the tooth, rather than to pass out through the apical foramen into the soft tissues beyond.

Dr. Schreier's preparation promises to be one of great value.

SULFURIC ACID. To Dr. J. R. Callahan, of Cincinnati, the profession is indebted for a method for finding obscure root-canals, and opening up such as are too curved and crooked to admit of the drill being used with either safety or thoroughness. If one or more of the canals are obscure, and the operator is unable to locate them, a pledget of cotton, saturated with a fifteen to fifty per cent. aqueous solution of sulfuric acid, should be left sealed in the pulp-chamber for forty-eight hours or longer. On removal, wash the cavity with an alkaline solution. Inspection will now show the presence of one or more discolored spots in the floor of the pulp-chamber, the remainder of the pulp-chamber being of a pearly-white hue. These discolored spots indicate the location of the root-canals. If any doubt exists, or if there are more discolored spots than the tooth should have root-canals, a slight burring over the stained spot will settle the question. If the discoloration persists, the opening to the canal has been located. Any other spots will be readily removed by the bur.

Having located the entrance to the canal, if a short constriction exist, it may be removed either with a drill or by the same method employed for enlarging a crooked canal. For this latter purpose a drop of the sulfuric-acid solution should be placed at the entrance to the canal with a syringe. This should be persistently worked into the canal with either an ordinary broach or, preferably, a platino-iridium broach. The acid gradually softens the walls, and the broach scrapes away the softened dentine, enlarging the canal. By this method any canal capable of being followed by a nerve-bristle may be enlarged. Milk of magnesia, a solution of sodium bicarbonate, or other alkaline wash should be constantly at hand, in order that the action of the acid may be promptly arrested if it becomes advisable. In the hands of the writer the use of the more diluted solutions has been attended by the best results.

In connection with leaving pledgets of cotton saturated with the solution in the cavity, Dr. Callahan calls attention to the fact that in his experiments the acid seemed to be self-limiting. He thought that ten minutes' contact of the acid to the tooth-bone produced as much action as was produced by twenty-four hours of contact when the pledget of cotton saturated with the solution was sealed in the pulp-chamber. In confirmation of this theory of self-limitation, he cites the following quotation from Professor J. S. Cassidy's work on "Dental Chemistry and Materia Medica," in which the author says, "The acid attacks the earthy portion, forming insoluble calcium sulfate ($CaSO_4$), and at the same time dehydrating the animal or gelatinous portion, which is mainly made up of carbon, hydrogen, and oxygen; these two latter elements are withdrawn as already alluded to, leaving the indestructible carbon as a residue, to be incorporated with the insoluble sulfate, producing thus a protective covering to the unaffected parts beneath against further inroads both of the causing agent and other solvents."

However this may be, Dr. Callahan's method of procedure would not be destructive of much dentine in any event, for the simple reason that the small amount of acid used quickly unites with the earthy part of the superficies to form calcium sulfate; calcium sulfate is chemically inert in this situation, and as the acid has disappeared in its formation, disintegration ceases for want of a producing agent.

In the root-canal the action is not thus limited. The constant churning of the broach scrapes away all insoluble *débris*, exposing

normal dentine to the action of fresh acid constantly. This favors chemical action until the mechanical act is discontinued.

PYROZONE. After a thorough trial pyrozone has proved its right to a position of honor in the armamentarium of the dentist. The three per cent. aqueous and the twenty-five per cent. ethereal solutions have developed especial usefulness. The medical and dental uses of both have been so amply and ably discussed that it will be unnecessary to consider them at length in this report. As a diagnostic agent in suspected suppuration the three per cent. solution is valuable, although in this connection it should be remembered that all hydrogen-dioxid solutions will cause a frothy, foamy reaction when brought in contact with fresh blood, or even when agitated in the mouth with the saliva and mucus. This is due to the combustion occurring when oxygen is brought in contact with albuminous substances ; the oxygen uniting with the carbon in the albumin causes wet combustion, evidenced by the foamy reaction so familiar to users of hydrogen-dioxid solutions.

The aqueous solution has been used with benefit in various gastric and enteric affections, and the rhinologist and laryngologist both testify to its efficiency in their specialties. As a prophylactic and therapeutic mouth-wash it is of value.

As a bleacher of teeth the twenty-five per cent. solution takes high rank. It is also useful as a superficial escharotic application in pyorrheal affections. Indeed, in this troublesome affection twenty-five per cent. pyrozone seems almost a specific. All strengths of pyrozone are stimulant to healthy and depressant to diseased tissue.

MILK OF MAGNESIA. In milk of magnesia the profession will find an excellent alkaline wash. This is not a suspension, but is a stable solution of the oxid of magnesium in water.

It is indicated in cases of erosion, hypersensitiveness about the cervices of the teeth, and other conditions evidencing excess of acidity in the oral secretions. A teaspoonful in a wineglassful of water makes an agreeable alkaline wash for use just before retiring. The milk of magnesia is an excellent antacid for dental purposes.

SECTION V.—Continued.

REPORT BY A. W. HARLAN, CHAIRMAN OF THE SECTION.

PRIOR to 1880 dental materia medica and therapeutics had not been taught in any dental schools in the United States by a dentist, save in one institution. Since that time nearly every school has instituted either a teaching professorship or lectureship, until now such chairs are fixtures in all progressive colleges, most of which are filled by dentists. This has been brought about largely through the agency of this Section in the American Dental Association, stimulating members of the profession to utilize the undoubted value of drugs in the treatment of many diseases of the mouth, teeth, and the peridental membrane, which were formerly treated by mechanical methods or not treated at all. To-day there is hardly to be found a dentist who does not use drugs in the treatment of alveolar abscesses of all varieties, and diseases affecting the pericementum, the antrum, and diseases of the pulp and mucous membrane of the mouth. This is exceedingly gratifying, and is an evidence of the attainment of knowledge by the whole profession. It is true that many drugs have been used empirically, and not a few have been found to be worthless; but the working dental materia medica of the present has been permanently enriched by the labors of dentists, and there are but few who do not understand the properties, uses, and doses of an increasing number of remedial agents. This is particularly true regarding the exhibition of analgesics, hypnotics, sedatives, and internal antiseptics, and other drugs for internal administration. To present a list of new drugs would be too confusing; therefore I content myself by extolling only a few.

During the past two years many new antiseptics and disinfectants have been introduced, also several new obtunding agents and astringents. Two of the most notable drugs that we have used most exten-

sively in treating diseases of the peridental membrane have been trichloracetic acid and alumnol, both freely soluble in water. Trichloracetic acid, as is well known, is stimulant, antiseptic, and astringent.

Alumnol is a white, impalpable powder, freely soluble in water. It is an astringent and stimulant of great value. We have experimented with many solutions, and have finally concluded that four to seven grains in one hundred and twenty minims of water, to which we add one or two minims of Ceylon cinnamon, is the best form to use in injections around the roots of teeth. The latter combination we have used in some cases daily for two or more weeks, and then at intervals of two, three, and four days, until the pouches and pockets have been filled with new growths. No particular directions are needed for the preliminary treatment in such cases, as this must include the removal of foreign bodies (serumal calculi and salivary calculi), necrosed edges of the process, and the holding the teeth firmly in place. A dilute solution of trichloracetic acid, one-half to two per cent. in water, is used daily for a week, then the above-mentioned solution of alumnol is persistently used in the majority of cases presented.

In one case of loosening of a superior right first bicuspid, pure wood creasote was used twice per week for eight weeks, with no beneficial result. In another, the identical treatment was followed by complete success. The tooth became firm, and no relapse has occurred for seven months.

Creolin was used in one case with an absolute cure, but in all other similar cases the results were *nil.*

The practice of using dilute solutions of silver nitrate is based on the tendency this remedy has to dry up the catarrhal condition of the mucous membrane of the mouth or other mucous surface. It is well known that in urethral or antral discharges solutions of silver nitrate have been used for forty or fifty years with success, and like results have been obtained with this drug around the roots of teeth in the oral catarrhal conditions sometimes found in certain localities, mostly where the air is laden with too much moisture from fresh water lakes, pools, and streams. Silver nitrate is a styptic and astringent. It is a stimulant in weak solutions, and is a caustic when concentrated. It is a destroyer of tissues in ten to twenty per cent. solutions and upwards. It has the objectionable feature of blackening the crowns and roots of teeth which other agents of even greater value will not do. When the surface of a hard structure, as the cementum, is brought

in contact with it, it leaves a rough body after the blackened surface is exuviated.

Silver nitrate is a moderately good bactericide, but on account of its tendency to produce deep coagulation it fails in many places, where blind pockets and pouches exist, to reach their uttermost depths, and the infectious spores are not destroyed. All local medication of the various diseased tracts around roots of teeth must, it seems to me, be based—when not caused by the administration of drugs—on the theory that such diseases have been brought about through the agency of micro-organisms, sometimes following local injuries to the gingival margins of the gums, or other accidents from external causes. It is impossible to treat all cases, however, from the purely local standpoint, as many diseases of a zymotic and constitutional character may co-exist and retard, if not prevent, the cure of diseases of the pericementum.

In all cases of not clearly distinguishable local origin, a course of administration of tonics, alteratives, and internal antiseptics is indicated. I have found five-grain doses of potassium iodid, three times daily after meals, in syphilis in the tertiary and later stages of the disease, to be most beneficial if continued for periods of two or three weeks, then allowing a rest of one week and beginning again ; such small doses, in the absence of gummatous formations, being more beneficial than ten or twenty grains or more, and they are much less irritating to the stomach.

The systematic use of pure drinking water in large quantities must not be neglected, as water is a diluent and eliminator of such value that all mucous surfaces are benefited, and glandular activity is thereby incited to such a degree that many poisons of bacterial origin are gotten rid of through the excretory organs.

One factor in the local treatment of pyorrhea alveolaris is gum-massage practiced by the patient. I have found that the following prescription is most useful :

℞—Lanolin, ʒi ;
Boric acid, gr. xl. M.

The patient is instructed to rub the gums twice daily for five minutes with the fingers or a rubber pad. I impress upon him the absolute necessity of this procedure as a part of the treatment in such cases. A few drops of some essential oil may be incorporated to add piquancy to the taste of this mixture. I prefer the Ceylon cinnamon. This is

to be continued during the whole course of the treatment, and afterwards for one month. If there is a tendency to bleeding of the gums, it will cease after a few days of such treatment. I add occasionally twenty grains of tannic acid to this mixture, which is quite enough to accomplish the desired result.

In conclusion, I venture to express the hope that no one fails to comprehend the absolute necessity for cleanliness of the mouth, teeth, and skin during the treatment of such cases, and furthermore that remedies cannot be used successfully in pouches or pockets unless they are injected through a syringe having a delicate gold or platinum point.

SECTION V.—Continued.

Formalin.

REMARKS BY J. S. CASSIDY, OF THE SECTION.

I WISH to call the attention of the Association to a new remedy. My attention was directed some three months ago to a preparation made by Schering, of Berlin, called formalin. The experiments made since then were in the direction suggested by Miller,—of finding something that will sterilize or embalm permanently the contents of inaccessible root-canals. Lest there may, however, be any misconception in the minds of any present by confounding this preparation with secret nostrums, I will state that its composition is well known, as are also the methods of its manufacture. It consists of an aqueous solution of formaldehyd. Formaldehyd is the aldehyd of methyl alcohol, the typical acid of which is formic acid; hence its name, and hence the name of the proprietary preparation, the only one of the kind I know of, called formalin.

Formaldehyd is a gas, having the formula of CH_2O; hence it has approximately the same density as the atmosphere. The gas is readily absorbed by water, from which it escapes readily when exposed, escaping more readily under increased temperature. The gas, as it escapes from the aqueous solution, can be absorbed by certain solid, porous, or fibrous substances, such as muscular tissue, dentine, silk, cotton, linen, etc. When condensed in these solids, it solidifies itself by the molecule condensing three times, as it were, resulting in peri-formaldehyd, having the formula $C_3H_6O_3$. The gas escapes from this solid form more readily and with more energy than in the ordinary condition, and its action generally consists in either abstracting oxygen, forming the typical acid CH_2O_2, or uniting with nascent hydrogen, which sends it back to its original starting point of methyl alcohol, CH_4O.

Now, as to its practical application. We cannot yet determine the result of experiments made in the mouth, owing to the short period in which it has been handled in this country, it having only appeared here in general surgery within the present year, but from experiments made out of the mouth the following seems to be demonstrated. It completely cooks muscular tissue by one immersion. It does not coagulate albumen, as does mercuric chlorid, temporarily, but permanently unites with albumen to form a homogeneous mass, which upon drying resembles horn,—hard and insoluble, and to all appearances permanently sterilized. The yolk of an egg is cooked, retaining its form the same as when the yolk of a boiled egg is exposed, having about the same consistence as when hard boiled, except that the sulfur in the yolk is not expelled. The sulfuretted hydrogen, in other words, is not apparent. It is not a poison as we understand that term, although it is not intended for internal use. It does not corrode instruments. Its odor is not unpleasant, neither is its taste. The one per mille to two per mille solution will destroy the most persistent micro-organisms. The one to three per cent. solution will disinfect any culture or any decomposing fluid that I have experimented with, such as pus, broken-down pulp-tissues, decomposing blood, etc. Without enumerating the different substances, you can conceive the great number of fluids and mixtures that can be included.

The literature in regard to it which I have seen also suggests, on account of its being readily absorbed by certain porous solids, that forms be used which any dentist can manufacture in a short time, such as a combination of plaster, sand, and pumice, made into little cakes and dried. It is found that these little cakes will absorb formalin, and when so placed in a drawer containing instruments it will keep them perfectly sterilized, provided they be disinfected before,—that is, cleansed by ordinary means.

I don't wish to say much on the subject of this preparation, because of the short time we have been experimenting with it. It is yet too soon to determine what its action will be in these inaccessible root-canals.

[NOTE.—Dr. Guilford asked to reopen the subject of Pathology, in order that a curious case of hypertrophy of the pulp might be presented. The case and the discussion upon it will be found at page 202.]

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time, August, 1895:

Resolved, That henceforth no person shall be received as a delegate who is in arrears for dues, or until he has paid to the Treasurer the full amount due at the time his name was dropped for non-payment.

Adopted 1874.

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

Adopted 1879.

Resolved, That hereafter no society shall be entitled to representation in this Association that does not require its members to live up to the requirements of our Code of Ethics.

Resolved, When it comes to the knowledge of the Committee on Credentials that any applicant for membership is violating our Code, said applicant shall not be received, and all such applicants shall be referred by the Committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code, except where the violator is a member of this body and has no membership in any local society.

Adopted 1881.

Resolved, That the Secretary be instructed to assign members, who may neglect to make their own choice, the Section in which they are expected to work.

Adopted 1879.

Resolved, That the reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

1879	commencing	with	No. I.	1895	commencing	with	No. III.
1885	"	"	No. VII.	1896	"	"	No. IV.
1886	"	"	No. I.	1897	"	"	No. V.
1892	"	"	No. VII.	1898	"	"	No. VI.
1893	"	"	No. I.	1899	"	"	No. VII.
1894	"	"	No. II.	1900	"	"	No. I.

Adopted 1879.

Resolved, That a paper presented to the Committee on Voluntary Essays and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterward be read before the Association unless it is made the special order by resolution adopted.

Adopted 1885.

It shall be the duty of the Executive Committee of the Association to provide at the opening of each annual meeting a book for the registration of members or visitors as they arrive, which shall also give place of residence and hotel where each may be found.

Adopted 1886.

Resolved, That in the future this Association discountenance the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

Adopted 1886.

Resolved, That it shall be the duty of the Chairman of the Credentials Committee to procure and keep a book wherein each delegate who wishes to be considered a permanent member of this Association shall enter his name.

Adopted 1886.

Resolved, That it is unprofessional to use on cards or signs anything except name, title, and address.

Adopted 1888.

Resolved, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in this Association without the payment of dues; and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

Adopted 1889.

WHEREAS, The National Association of Dental Faculties has passed a resolution adopting a three years' course of instruction after matriculation as essential to graduation; therefore

Resolved, That in the future no dental college shall be represented in this Association that does not comply with the course of instruction adopted by the college association named.

Adopted 1889.

Resolved, That this Association now in session direct that Sections belonging thereto shall in the future be prohibited from inviting individuals who are violating the Code of Ethics to hold clinics or to give other exhibitions before this body.

Adopted 1891.

Resolved, That a permanent Standing Committee on Necrology be appointed, to consist of five members, whose duty it shall be to act, without further instruction from this body, as occasion may require, and report to the annual meeting of the Association.

Adopted 1891.

WHEREAS, Section I has been unable in recent years to obtain sufficient matter to make a proper report; and

WHEREAS, It is the opinion of the Section that it is properly entitled to papers on crown-work, bridge-work, and orthodontia; therefore, be it

Resolved, That hereafter all papers on these subjects shall be submitted to Section I.

Adopted 1892.

Resolved, That a Standing Committee, to be styled the "Committee on State and Local Organizations," and composed of three members, shall be appointed, originally for terms of one, two, and three years respectively, and that all vacancies due to expiration of term shall thereafter be filled for terms of three years. All vacancies occurring from any other cause shall be filled for the unexpired term.

The basis of the plan and scope of work of said Committee, and its duties in relation thereto, shall be the suggestions as set forth in the address of the President of the American Dental Association for the year 1892; also the articles from which he quotes, and in harmony with the circular letters issued by the Chairman of the Executive Committee.

Adopted 1892.

Resolved, That two general addresses be delivered annually, on the second and third days' meetings, on some general topics of interest to the whole profession, the subjects to be selected by the third division of the Executive Committee, the first division of the Executive Committee to nominate the essayists annually.

Adopted 1894.

Resolved, That a Standing Committee of nine be appointed, to be known as the Committee on Terminology, whose duty it shall be to prepare and submit a carefully prepared report at each annual meeting of this Association.

Adopted 1894.

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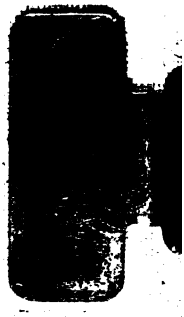

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